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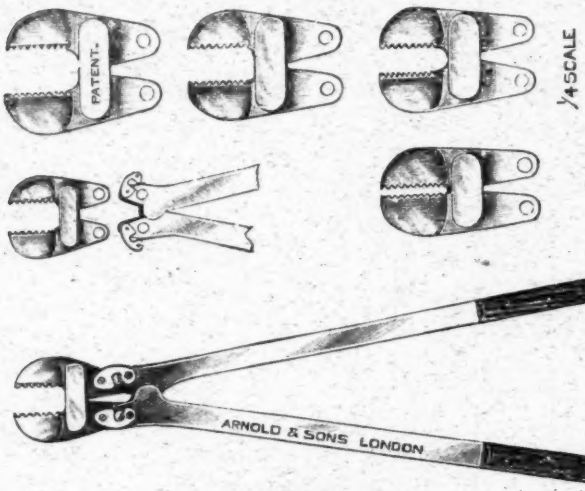

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Dr. S. S. Cameron, M.R.C.V.S.

THE

VETERINARY JOURNAL

JULY, 1911.

DR. S. S. CAMERON.

THE appointment of Mr. S. S. Cameron, D.V.Sc., M.R.C.V.S., to the high position of Director of Agriculture and permanent head of the great agricultural department of the State of Victoria, is one that affords much pleasure to his numerous friends throughout the Commonwealth of Australia.

Dr. Cameron, whose photograph we publish in this issue. qualified as M.R.C.V.S. in 1888, after a brilliant career at the New Veterinary College, Edinburgh. Soon afterwards he was appointed to the Melbourne Veterinary College, where he proved an able first lieutenant to Dr. W. T. Kendall in the building up of the new school.

In 1895 he accepted the appointment of Veterinary Officer to the Dunedin (N.Z.) City Council, but a year later he returned to Victoria as Veterinary Officer to the Board of Public Health. In this capacity he was the means of inaugurating extensive reforms in the slaughtering of stock for the metropolitan meat supply. So successful an official of this department did he prove that in 1906, when the Government decided to establish a veterinary branch of the Agricultural Department, his abilities received the recognition they deserved and he was appointed Chief Veterinary Officer to the State, and soon afterwards the whole administration of the Acts relating to live stock was placed under his control.

The Stock and Dairy Supervision Act is chiefly his creation, and in the administration of this he, along with the Veterinary Branch, has earned high praise from the community. In addition

to the ordinary routine duties, Dr. Cameron four years ago secured the approval of regulations he drafted providing for the examination and registration of stallions throughout the State. That both the principle and the methods of administration have proved successful is evidenced by the fact that during the past year they have been followed practically in their entirety by the other States of the Commonwealth.

In 1909 the University of Melbourne conferred the degree of Doctor of Veterinary Science on Mr. Cameron for his thesis on hereditary unsoundness in horses, which has been published in this Journal, and contains data and observations of very great value. Recently the Directorship of Agriculture became vacant and the State Government offered Dr. Cameron the position, feeling confident as a result of his previous services that he could thoroughly re-organize the Department and lead it into a state of complete efficiency. That his capacity and labours are thoroughly recognized is shown by the following extract from a leading article in a paper which, although criticizing somewhat pessimistically his new appointment, has nothing but praise for his past achievements:—

"Dr. Cameron undertook the work of seeing that clean milk was supplied to the people of this State. Under his authority the Dairy Supervision Act was administered. Cans were decently treated. Dams had to be kept clean and wholesome. The risk of contaminated milk was reduced to the lowest possible limit. This was a great work, for which Dr. Cameron is deserving of the highest praise."

We heartily congratulate Dr. Cameron on his new appointment.

Editorials.

THE USE OF THE ARMS AND CREST OF THE ROYAL COLLEGE OF VETERINARY SURGEONS.

In an editorial note in our June issue, we referred briefly to the above matter, and drew attention to a paragraph in the annual report of the Royal College of Veterinary Surgeons, in which it was stated that members of the Royal College are not entitled to use the armorial bearing on their stationery without paying duty. Such is the opinion of counsel. It would appear that the practice was an indulgence granted by the Board of Inland Revenue, and that the collecting of the tax has changed into the hands of the county councils, who are attempting to enforce the payment of such duty. At the time we referred to the matter there was a case *sub judice* in which Mr. Kirk, a London veterinary surgeon, and himself a barrister-at-law, was sued for the amount of the licence duty by the London County Council. We are very glad indeed to state that the learned magistrate, Mr. Curtis Bennett, did not adopt the same attitude as counsel who was consulted by the solicitor of the Royal College of Veterinary Surgeons, and he decided in Mr. Kirk's favour. He pointed out that it is not a personal matter, but the use of the arms and crest by members of the Royal College of Veterinary Surgeons for business purposes is simply an indication of membership of the College and as such is permissible. The practice has been observed years longer than the oldest amongst us can remember, and it is indeed strange that it should now be considered illegal by the tax-collecting authorities. If it be so, then every member of a club who uses notepaper bearing his club's crest, and every public schoolboy who uses similar paper with his school's crest, must be liable for the payment of the licence duty. Surely such a contention could not stand, and one might be forgiven for regarding it as absurd.

We are given to understand, however, that this decision is not to be allowed to go unchallenged, and that the L.C.C. taxing authorities have given notice of appeal against it. Now we consider that this is a question that is of importance to every member of the College, and that the appeal should be resisted to the utmost. Moreover, it should not be left for one man to bear the

whole of this expense, which no doubt will be considerable. Obviously the right thing is for the Council of the Royal College of Veterinary Surgeons to take the matter up and support Mr. Kirk to resist the appeal. But unfortunately the funds of the College are not in a position to permit of that, and therefore any support must come voluntarily from members of the profession. This suggestion has been well voiced by Professor Woodruff, the Editor of our weekly contemporary, *The Veterinary News*, who is prepared to organize a fund for the purpose. We commend it strongly to our readers, and ask them to send along at once any sums they are willing to contribute to assist in preserving to us what we consider our legitimate rights. The proprietors of THE VETERINARY JOURNAL, who have the welfare of the profession at heart, will gladly contribute two guineas to the fund, and any remittances that come to hand we will hand over to the proper quarter.

This is another item to be added to the long list of things the Royal College might take up on behalf of the profession if it were only put in possession of adequate funds.

THE NATIONAL VETERINARY ASSOCIATION.

THE annual meeting of this Association is to be held this year at Carnarvon during the last week of this month. This will be the first visit of the National to the Principality, and the President, Mr. T. S. Price, together with the energetic local committee, headed by Mr. R. Hughes, of Oswestry, as Chairman, and Mr. L. W. Wynn Lloyd, of Carnarvon, as local Secretary, are doing their best to make it a very memorable one.

An excellent programme of papers has been arranged on subjects of the highest importance by gentlemen who are acknowledged experts in their particular subjects. "Surgical Shoeing" is to be dealt with by Mr. H. Sumner, M.R.C.V.S., and Mr. E. A. West, F.R.C.V.S., two men with exceptional experience in the subject. "Economic Feeding of Horses and Cattle" is to be introduced by Mr. Henry Taylor, F.R.C.V.S., who is an Examiner in Dietetics for the Royal College of Veterinary Surgeons, and the discussion is to be opened by Professor Woodruff. We are to get two papers on "Sclerostomiasis," by Drs.

Annett and Leiper, than whom nobody is more capable of dealing with this difficult problem from the pathological and biological aspects, while Mr. Noel Pillers, F.R.C.V.S., will open the discussion. The remaining paper is on "Veterinary Education in Relation to Public Health," by Dr. Bradley and Mr. J. W. Brittlebank, M.R.C.V.S., who will present both sides of the question. We expect that the question of amalgamation will also be brought forward for serious, and we hope favourable, consideration. It will thus be seen that various tastes are being catered for, and it only remains for the members of the Association to turn up in good numbers and make the meeting the success it deserves.

Nor has the social element been neglected, and an excellent programme is being arranged for the entertainment of members and their wives or daughters. It will be remembered that Carnarvon is to be the scene of the Investiture of the Prince of Wales a short time before our visit, and the ancient town with its famous old Norman castle will be at its very best. Moreover, it is situated within easy reach of some of the most beautiful scenery of the world, including Snowdonia. The annual banquet, to which the ladies are also invited, is to take place at the Sportsman Hotel on the evening of the first day. The Mayor of Carnarvon has kindly promised to give a reception to members, and this will probably take place on the second day of the meeting. On the third day we are invited by the North Wales Veterinary Medical Association and the Welsh practitioners to an excursion through the heart of Snowdonia. It will probably take the form of a drive to Beddgelert, where lunch will be provided and where time will be given for those desirous of doing so to walk to the famous Pass of Aberglaslyn (1 mile). The drive will then be continued up the Gwynaut Pass, round Snowdon, and down the Llanberis Pass to Llanberis. Here tea will await us, to be followed by a drive back to Carnarvon by another route. Those who care to do so can leave the rest of the party at Llanberis and ascend Snowdon by the mountain railway and return to Carnarvon by rail.

The energetic local secretary is also desirous of arranging a golf tournament. This is an innovation and should appeal to the many members who are fond of the Royal and Ancient game. Mr. Wynn Lloyd would be glad if golfing men willing to play

would send in their names early so as to facilitate the arrangements.

It seems to us that the National bids fair to excel itself. It has certainly never met in more beautiful surroundings, the arrangements have never been more excellent, and all we ask is good weather and a record attendance.

THE VETERINARY SURGEONS ACT AMENDMENT BILL.

In our last issue we commented on the fact that the Bill had been crowded out when it was to have been brought forward for second reading in the House of Commons on May 26, and that it was ordered to be brought up again on June 16. We regret to say that for some reason which we have not yet been able to ascertain, the Bill was not included on the Order paper for that day and consequently was not brought forward. We are very much afraid that there is now no hope for the Bill this session owing to the great congestion of business before the House, and the fact that the Bill is meeting with some opposition which will necessitate debate.

CORONATION HONOURS.

We are pleased to note that the veterinary profession was not altogether forgotten when the Coronation Honours were being bestowed.

Colonel Duck has received the honour of knighthood, and Colonel C. Rutherford, P.V.O., India, has been awarded the C.B.

Mr. W. Freeman Barrett, our President, was commanded to attend the Coronation Service in Westminster Abbey, where he represented the profession.

Major-General R. Pringle, C.B., D.S.O., represented the Veterinary Division of the War Office Staff in the Coronation procession.

General Articles.

QUESTIONS *RE* SPAVIN.*

By W. HUNTING, F.R.C.V.S.
London.

I SHALL commence by offering a definition of spavin with a view merely of limiting the subject, and of showing the condition about which I am thinking when offering answers to the questions. I am not referring to the so-called "occult spavin" or to bony enlargements on the postero-external aspect of the joint. My definition is—A bony enlargement on the lower and inner aspect of the hock.

Question 1.—Is spavin hereditary?

I suppose nearly the whole veterinary profession believe that it is. I do so myself. But I know one or two veterinarians who decline to adopt this view, and I respect their opinion because they have a large experience of practical breeding. The question ought to be answerable from the experience of living men, and the names and history of sires should put the matter beyond controversy. Are there any here to-night who can supply personal knowledge of sires suffering from spavin whose offspring have developed a marked number of this hock unsoundness?

When the Royal College of Veterinary Surgeons was consulted by the Royal Commission on Horses, the Royal Agricultural Society and the Hunters' Improvement Society as to what diseases should be considered hereditary, circulars were sent to the whole profession and answers returned by a large proportion of the members. If those replies are in existence they probably contain the evidence I desire.

Question 2.—Does any conformation of hock predispose to the occurrence of spavin?

The various conformations are included in such descriptions as straight, sickle shaped, strong, weak, wide, narrow, and tied in below. My own experience is that conformation is not a factor in the production of spavin. Some years ago I made a practice of noticing the form of hock in which I found spavin. The

* Read at the June meetirg of the Central Veterinary Society.

opinion I came to was that it might exist in any form of hock, and that every form of hock might be found without spavin.

Question 3.—Does it arise in the ligamentous or osseous structures?

I believe spavin commences as an ostitis. In any *post-mortem* examination of a spavin bony changes are the most marked lesion, and usually these changes are most extensive. I cannot believe that any damage to ligaments would set up inflammation not of one bone but of many, and yet leave the main articular surfaces (the tibia and astragalus) usually unaffected. If the disease commenced in the ligamentous structures we should expect lameness to occur suddenly and to be most intense during the first few days. There are such cases in which the symptoms of spavin are well marked. They occur suddenly, are accompanied by heat and swelling, and cause great pain and lameness. They are usually followed by some fibrous thickening around the joint, and may even cause fibrous-anchylosis, but I never saw one which on *post mortem* disclosed any articular destruction or union of bones.

In cab-horse disease, in ringbone, and in navicular disease we have conditions which are certainly the result of ostitis—of disease commencing in the bone and not in the ligaments. Reasoning from analogy, when we recognize in spavin lesions so closely resembling the changes found in the conditions I have just mentioned, we may conclude that the origin and progress is the same in all. Ostitis, like any other inflammation, may spread. As it extends through a bone it may reach the periosteum and thus cause visible exostosis. It may reach an articular surface, and there cartilage becomes affected with the usual result—destructive inflammation. When the cartilage is destroyed bony union takes place between the rows of small bones. All this seems inconsistent with the theory that the primary changes are in the ligamentous structures.

Question 4.—Is the enlargement or the lameness first apparent, or are they simultaneous?

As a rule, when a veterinary surgeon is called in he finds lameness and an enlargement. It does not at all follow that both arrived together, as the owner might have overlooked a slight lameness, and cannot be expected to have recognized a slight swelling with or without pain and heat.

The answer to this question affords some evidence bearing on the previous question. If we could say that lameness usually existed for a time previous to the appearance of enlargement, that fact would suggest that an ostitis was in existence. If it could be shown that an enlargement always appeared before or at the same time as lameness, we might be induced to credit the periostitis to a ligamentous change such as we acknowledge in splints. In an odd case or two, when I have known the horse previous to lameness appearing, there has been an intermittent stiffness for some days before the appearance of any enlargement. This stiffness or lameness was only apparent at starting, and was not suspected as being the first sign of a serious unsoundness.

I remember a case in which I diagnosed hock lameness but could discover no enlargement. The practitioner who was in attendance assured me that at the commencement of lameness—about a month previous—there was a distinct enlargement which had gradually subsided. The horse was fired and became sound. Was the enlargement osseous or only soft effusion? I know that in young horses spavins can develop with great rapidity, but I have no experience of their appearing and subsiding.

Question 5.—Is there any definite alteration of action which indicates spavin lameness?

The question may be put in another way—Is it possible for an experienced practitioner to diagnose spavin by the way in which a horse moves his hind legs? I confess I cannot diagnose spavin by merely noting the action, and I venture to doubt whether any other man can do so. Of course, when you have put aside foot lameness and fractures of the pelvis, all the other hind leg lamenesses come out about 90 per cent. of spavin. So that if you only guess instead of diagnose you will come out with a heavy proportion of success in practice. But here we do not want guesses, except so far as they help us to doubt and test.

It is quite certain that so long as the muscles and tendons connecting the stifle and hock are normal those two joints must work synchronously, and that any limitation of one must cause defect in the extension and flexion of the other. Hock-lameness exists, but its special symptoms are best recognized when we are quite sure that the lesion is not in the foot, the pelvis, or some other part of the hind limb. For my part I very confidently deny that there is any lameness which is correctly described as "hock lameness." Perhaps I ought to qualify this statement

by saying that a hind-leg lameness which gradually disappears on exercise may be credited to the hock. This continuance of lameness with its temporary cessation on work is, I admit, a useful guide, but what I deny as diagnostic is any form of action by which a man can say at sight—"that is due to hock mischief."

Question 6.—How does spavin cause atrophy of the gluteal muscles?

This atrophy only occurs when a horse lame from spavin is kept at work. A horse, say, in an omnibus, performs a daily journey of sixteen miles. He starts lame but in a little time goes apparently sound. On returning to the stable he soon shows signs of pain, and rests the leg. If he be put in a loose box and not worked, the wasted gluteal muscles begin to fill up. How does this fact tally with the theory that atrophy results from disuse? When the horse did daily work gluteal wasting took place, when rested in a box the atrophy ceased to develop and in time disappeared.

This fact puzzled me for a long time, but I think I have found the explanation. So long as the horse worked, the painful condition of the hock remained and in the stable was aggravated. He therefore rested the limb and the gluteal muscles were in disuse all the time between journeys. In other words, during twenty out of the twenty-four hours of the day disuse was marked. When work ceased altogether, pain in the hock abated and the gluteal muscles gradually came more into use and atrophy ceased.

Question 7.—Why does the pastern become upright and the horse go on his toe if spavin lameness persists? I look upon this sequel of spavin, not as due to a positive contraction of muscle, but as a shrinking of tendons and ligaments to suit the most constant position of the limb. The fetlock is flexed to give ease to the painful hock, and the ligaments adapt themselves to the acting conditions.

Question 8.—What is the best treatment?

There may be difference of opinion as to the best method of treatment, but I think there can be only agreement as to the desirability of commencing treatment immediately any lameness is detected and located. Many cases of spavin show only slight lameness in the early stages, and what lameness there is passes off with exercise. Owners do not like losing the services of their horses and are apt to argue—"this lameness is only slight

in a month or two I shall not require the horse so urgently, and I will then have him treated." My experience leads me to believe that these are the cases which remain lame and which no treatment benefits. The time to treat spavin is at its commencement and then we may hope that the ostitis will cease when all the bones affected are united.

I have tried blistering, and not had much success. I think as a rule sufficient rest is not given when blistering is adopted.

Firing I rely on as the best treatment. I fire in transverse lines, but put one puncture through the skin over the most prominent part of the spavin. With this I require three months' rest.

Setons I have used and seen used with tolerable success. The late Mr. Freeman, of Hull, did quite a special practice. He made an opening in the skin an inch or two below the spavin, then with a blunt seton needle passed upwards separated the skin over the spavin. Into the cavity thus formed a piece of tape soaked in solution of corrosive sublimate was inserted and left for twenty-four or forty-eight hours. Attention was given to the wound for some days. There was much swelling and some suppuration. The wound was kept open by passing a probe into it, and pressing the fingers downwards over the track of the seton got rid of the pus.

Some years ago I gave an extended trial to cunæan tenotomy, and had many good results—about 80 per cent. This is probably about the percentage of recoveries resulting from any treatment for spavin when sufficient time is given for a long rest. The cases which did best after cunæan tenotomy were certainly those with a well-developed bony enlargement.

Posterior tibial neurectomy I have not found reliable or successful. Of the double tibial neurectomy I have no experience.

SUGGESTIONS FOR CONTROLLING TUBERCULOSIS AMONG FOOD ANIMALS.*

By J. S. LLOYD, F.R.C.V.S., D.V.S.M.
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Indexed B. A. L.

It will be useless taking up the time of this meeting in discussing the inter-communicability of human and bovine tuberculosis, because I think the conclusion of the Royal Commission on Tuberculosis, that the disease in animals and man is one and the same, is now generally accepted. That, I take it, is a sufficient reason why tuberculosis in food animals should be controlled, or if possible eradicated.

Remembering that horses and dogs are not generally used as food for human beings in this country, although occasionally affected with tuberculosis, those animals may be at once eliminated from the subject under discussion. Remembering also that the disease is only infrequently seen in sheep, these animals can also be left out of account, and my only remark in connection with them is to ask the questions—Why is tuberculosis so uncommon among sheep? Is it because of the open-air life they almost invariably lead? Has the sheep a stronger power of resistance to the disease than some other ruminants? I am not aware that the latter matter has been investigated. Leaving out of consideration the presence of tubercle in ground game, and birds, as being of minor importance, we can thus narrow the food animals affected with the disease and used commonly as human food, to cattle and swine.

Tuberculosis is well known to be prevalent in both these classes of animals, but I do not propose to give statistics to prove that such is the case. Granting that it is so, what are the certain results, (1) as affecting the stock-owner, (2) as affecting the consumer of meat and milk from tuberculous animals?

It has been stated by some that the individual loss to owners of cattle by tuberculosis is not great, but remembering the prevalence of the disease, the fact that a certain number die from tubercle, and that a far greater number as a result of infection are unthrifty, there can be no doubt that taken collectively, tuberculosis amongst cattle and swine must cause considerable loss to the owners of such animals. That the meat of badly infected tuber-

* A paper read at the Birkenhead Congress of the Royal Institute of Public Health.

culous carcases, and the milk of cows affected with tuberculous udders, are a menace to the health of the consumers probably no one will deny; hence, sufficient reasons why steps should be taken against tuberculosis among food animals, (1) to lessen the loss to stock-owners, (2) to safeguard the public health.

In dealing with preventive measures we may conveniently consider what has been done so far under the two headings just mentioned. To assist owners of tuberculous stock practically nothing has been done in this country except by individual effort; whilst as to safeguarding the public health, certain recommendations have been issued by the Local Government Board, with the intention of assisting inspectors of meat when dealing with the carcases of tuberculous animals, and certain limited legal powers have been given to local authorities generally under the Dairies, Cowsheds, and Milkshops Order of 1899, and to a few of the larger cities in the country under the Tuberculous Milk Clauses, to deal with milk from cows affected with tuberculosis of the udder.

It will, however, be obvious, that in thus dealing with tuberculous meat and milk, local authorities are only following in the wake of the disease and its results, whereas, for any action to be of lasting and efficient benefit, the disease should be attacked at its source.

The Second Royal Commission on Tuberculosis recommended that steps should be taken not only against tuberculous meat and milk, but also to eliminate tuberculosis from amongst farm animals, but so far nothing has been done in the latter direction, and chiefly, I think, because of the expense such action would necessarily entail.

In order to effectually discuss any measures towards the elimination of the disease, it will be well for us to consider how and under what conditions the disease is spread, and what well-established facts are now known in connection with methods of infection, which can be taken advantage of in methods of control.

It is now well known that the disease, although occasionally congenital, is not hereditary, thus giving us the foundation fact that young animals are, generally speaking, free from the disease. It has also been well established that animals housed in insanitary and tubercle-infected houses, almost invariably become victims of the disease. It has further been established that infected animals

sooner or later disseminate tubercle bacilli, from one or other of the natural openings of the animals' bodies; it may be the coughing of infective sputa from the throat and lungs, infective fæces from the intestines, infective urine and discharges from the genitals, or infective milk from diseased udders. Such being the case, can we wonder that houses inhabited by such animals become hotbeds of the disease, and that tubercle-free animals brought for housing therein soon become affected?

Taking these facts into consideration it becomes obvious, that in order to eliminate or even to control the disease amongst farm stock we must, (1) get rid of all animals suffering from the disease that are dangerously infective to other animals, (2) that houses inhabited by such dangerously diseased animals must be thoroughly disinfected before being again occupied by other susceptible animals, and (3) that young animals must be kept from contact with diseased ones, fed on non-infective food and reared in tubercle-free sanitary buildings or in the open air.

The open-air treatment of human consumptives has been proved to be of considerable benefit to patients, and its bracing qualities must unquestionably be of at least equal, if not greater, benefit to young animals.

In order to carry out the above requirements, it is apparent that two things become necessary; first, to find out when animals are diseased, and second, to know when diseased animals become dangerously infective. Thanks to tuberculin, the first is a comparatively easy matter; periodical testing being all that is necessary in order to find out the diseased animals. The second is far more difficult. It is practically impossible to know when diseased animals become dangerously infective, and the only certain and effectual way to prevent infection is by keeping the healthy and diseased animals apart. It of course follows that once an animal is known to have become dangerously infective, the only proper course is to have such an animal isolated, if not immediately destroyed.

Such then are the foundation facts to be borne in mind when discussing preventive measures, or when suggesting methods of control. They embody practically the suggestions or recommendations of the Second Royal Commission, and have been put into force as regards testing and segregation by Bang, and as regards destruction of dangerous animals by Ostertag, both with measures of success.

A serious attempt to grapple with the disease has been made in America, particularly in the States of Minnesota, Pennsylvania, Wisconsin and Massachusetts, but in all of these States the work is badly hampered by want of funds. For instance, Wisconsin is estimated to have a cattle population of over three millions, but only 41,000 were tested, either officially or unofficially, during the year 1907-1908, a rate of progress which will take about eighty years to test once all the cattle in the State. Similarly in the case of Pennsylvania with its two millions of cattle and 60,000 tested, it will take at that rate thirty-three years to test all the cattle once. It will therefore be granted that to take steps for eradicating the disease altogether, enormous funds would be wanted; even to deal with the dangerously infective animals a considerable cost would be involved, a cost which owners of stock cannot stand, and consequently must be borne by the State.

Bang, however, has shown that successful individual and voluntary effort to rear a tubercle-free herd can be done cheaply, and providing that great care is taken by the individual stock-owners concerned, great and lasting benefit results.

Two methods of controlling the disease thus become apparent; destruction of dangerously infective animals—that is, dangerous to other animals or human beings—to be dealt with by, and at the expense of, the State; voluntary attempts by individual stock-owners to rear up tubercle-free herds. The first of these methods was practically embodied by the Board of Agriculture in the Tuberculosis Order of 1909, now unhappily withdrawn. All authorities who have given careful consideration to this question of controlling tuberculosis welcomed the Order, but it met with considerable opposition from the ratepayers, because the cost was to come out of the local rates; and strange to say, city and country ratepayers opposed it for opposite reasons. Country ratepayers opposed because it would apparently benefit the public health of the towns at their expense, whilst city ratepayers welcomed the protection it gave to publich health by safeguarding meat and milk supplies, but objected to pay rate-aid for the purpose, because the Order made no attempt to assist owners and breeders of stock to raise tubercle-free herds and thus make a first attempt to reduce the number of tuberculous animals in the country.

Apparently both classes of ratepayers had good grounds for their objections, and whilst it is highly desirable that some efficient

if only preliminary steps should be taken to deal with tuberculosis among animals, it would seem that any new Order made and put into force should be supplied with State-aid for both compensation and administration, and ought to give material assistance to pioneer owners of stocks who voluntarily attempt to establish tubercle-free herds of cattle and swine. Such action would certainly tend to reduce the amount of tuberculosis among food animals by removing the dangerously infective from all herds, and would be a beginning towards obtaining clean herds in different parts of the country, the latter probably becoming centres of education for the benefit of neighbouring farmers. Further, the removal and destruction of the dangerous animals under proper veterinary supervision would in a large measure protect the public from the danger of consuming tuberculous meat and milk.

It has been mentioned above that the efforts of Bang and others in building up tubercle-free herds has been more or less successful. Failure has generally arisen through the accidental introduction of tuberculous animals into otherwise free herds; but knowledge of such a danger should cause greater efforts to be taken to prevent such an occurrence. In this country, no doubt, failures in many instances will be recorded, but persistent and steady effort by both the State and the stock-owner combined must prove advantageous in the end. It must not, however, be looked upon as more than a preliminary towards controlling the disease.

One step has been discussed, and in two countries put into force, that is "stamping out." In Belgium and Massachusetts it has been tried and failed. Taking into consideration the enormous cost it would involve and the dislocation of the cattle breeding and milk and meat producing industries that must necessarily follow, I do not suppose that such a course would be seriously considered in this country for a moment, and it can consequently be summarily dismissed from further discussion.

A second step is one which demands much more serious consideration—I now refer to anti-tuberculous vaccination. I will not describe the technique or results of this method of immunizing young cattle against the attacks of tubercle bacilli. Various veterinarians on the Continent have, however, been working at it since 1884, although it is only much more recently that serious and to some extent successful attempts have been made to carry it

out on a fairly extensive scale. Von Behring, Rossignal and Vallée have been working at it, and lately M. S. Arloing (VETERINARY JOURNAL, June, 1910) has claimed complete success in from 40 to 50 per cent. out of sixty animals treated. The method of procedure adopted by the latter observer has been to modify the tubercle producing properties in both human and bovine tubercle bacilli by a series of homogeneous cultures in the depth of 6 per cent. glycerinated bouillon, and at different temperatures and pressures. These modified cultures have been used for immunization purposes in three ways, subcutaneous, intravenous and digestive. By intravenous injection Arloing obtained 75 per cent. of complete successes, by ingestion 50 per cent., by subcutaneous injection 10 per cent. of complete successes and 73 per cent. of partial successes, and states that there is no ground for doubt and unrest as regards vaccination, and that he will not hesitate to use vaccines on a large scale.

As a preventive measure, even if only tentative, vaccination appears to me to warrant trial in this country, and as the results, whether successful or unsuccessful, would be for the good of the nation, such trials ought to be undertaken by the State.

To sum up, the only suggested measures for controlling tuberculosis in food animals which appear to me to be capable of being put into immediate action are:—

(1) An order by the Board of Agriculture compelling compulsory notification, investigation and slaughter of dangerously infective tuberculous animals—that is, animals affected with "open" tuberculosis, with compensation according to carcase value, and prosecution for failure to notify.

(2) Pecuniary assistance by the State to owners of stock who are willing to attempt the production of tubercle-free herds, and agree to carry out requirements considered necessary to obtain success, special consideration being given to the production of tuberculin, free testing, segregation, sanitary buildings, disinfection, &c.

(3) Experiments in vaccinating young animals against tubercular infection to be carried out by, and at the expense of, the State.

All the above are of course only preliminary measures; success or failure will point the way for further measures in the future.

THE TRANSMISSION OF AFRICAN HORSE-SICKNESS TO THE DOG BY FEEDING.

Indexed B. A. L.

By LL. E. W. BEVAN, M.R.C.V.S.

Rhodesia, Post-Graduate of the Royal Veterinary College, London, and Pasteur Institute, Paris.

In view of the recent controversy as to the susceptibility of the dog to African horse-sickness, the following notes may be of interest.

From January 23 to 30 the hounds of Gwelo Hunt Club were fed on a mule that had died during the reaction following Dr. Theiler's method of immunizing against horse-sickness. On the 30th they were given the hind leg of another mule which had been inoculated six weeks previously. On February 2 (ten days after they fed upon the first mule) one hound died during the night. This animal had been noticed to be off his feed at the previous evening meal, but all the others ate well and appeared in good health. At 9.30 a.m. on February 2 the hounds "Pilgrim" and "Vixen" showed the first symptoms of the disease, and at 1 p.m. the former died, while "Vixen" died at 6 p.m. the same day. On the morning of the 3rd "Vista" and "Mentor" developed the sickness, and were dosed twice a day with arrhenal. "Vista" recovered after two days, and "Mentor" after five days' sickness.

On the evening of February 3 "Music" and "Haughty" showed symptoms, and both were removed from the kennels, the latter dying during the removal; "Music" was carefully nursed and dosed with arrhenal, but died on the 6th.

The remainder of the hounds in the kennel, consisting of 6 half-breds and 10 thoroughbreds, were not affected by the disease; one thoroughbred bitch on double rations of meat showed no signs of any sickness. For the past two or three years it has been the custom to feed the hounds on carcases of animals that have died from "horse-sickness."

About the same time 11 dogs in Gwelo, which also consumed some of the inoculated mule, died in the vicinity of the kennels; several died at the same time as the hounds and some shortly before the hounds became affected.

The symptoms described by Mr. J. A. Godfrey, honorary secretary and huntsman, and G. V. S. Rowland Williams (who proceeded to Gwelo to investigate the outbreak) were, quickened

and laboured breathing, high temperature, and death generally three to eight hours after the onset of symptoms. As the disease developed the jaws became tightly locked and the tongue a distinct bluish colour. The mouth appeared abnormally dry. Mr. Williams states that the visible mucous membranes were anæmic rather than congested.

The only *post-mortem* lesion mentioned is froth in the lungs.

On February 5 Mr. Williams kindly obtained a quantity of blood from the hounds "Music" and "Mentor," which was

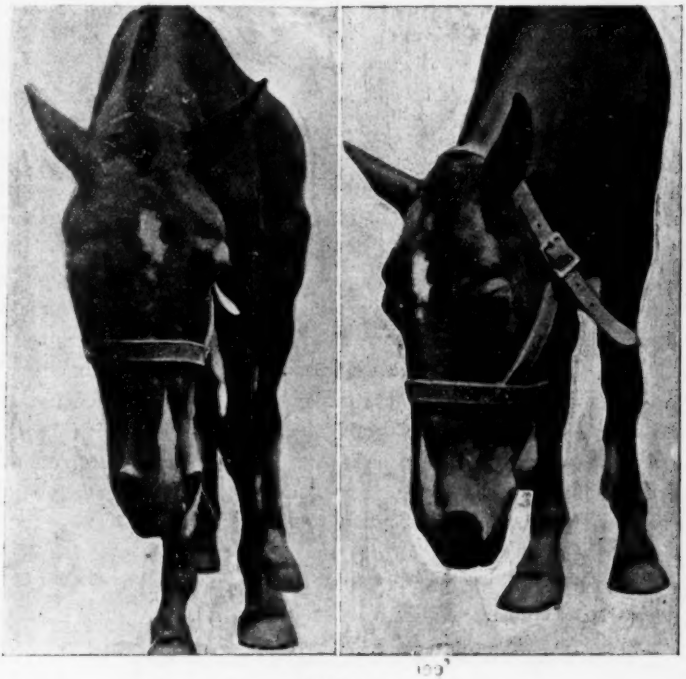

FIG. 1.

Photograph of horse "Don Q," showing "Dik-kop."

mixed with the usual glycerine, water, phenol preservative, and was brought to the laboratory where it was kept until February 24.

On that day 20 c.c. of this virus, made up of equal quantities from each hound, was injected under the skin of the neck of the horse "Don Q," which had been and was subsequently kept in

a mosquito-proof stable at the laboratory. The following is the temperature record of this animal:—

HORSE-SICKNESS.

Subject.—Bay gelding, "Don Q."
Date.—February 24, 1911, at 4.30 p.m.
Virus.—20 c.c., blood taken February 5, 1911, from hound "Gwelo" suspected to be suffering from horse-sickness. Subcutaneous injection.

Date.	No. of Days.	Morning Temperature.
February 25, 1911	1	100·4 °F.
,, 26, ,,	2	100·2 ,,
,, 27, ,,	3	100 ,,
,, 28, ,,	4	100 ,,
March 1, ,,	5	100·2 ,,
,, 2, ,,	6	103 ,,
,, 3, ,,	7	104·2 ,,
,, 4, ,,	8	104·6 ,,
,, 5, ,,	9	100·8 ,,
,, 6, ,,	10	Dead

On March 4 this horse was noticed to be extremely dull, and shifted from one foot to the other in the manner characteristic of horse-sickness ("Paddling"). On the 5th it showed the typical symptoms of "Dik-kop," and the photograph reproduced was taken.

It died early on the morning of the 6th, and *post-mortem* examination revealed the characteristic lesions of horse-sickness, notably, large quantities of straw-coloured fluid in the pericardial sac, intense hyperæmia of the villous portion of the stomach.

During the course of the autopsy portions of the heart, liver and muscles of this horse (about 6 pounds in all) were thrown to a large mongrel bitch, who swallowed them greedily and retained them. This dog was kept under observation, the following being a record of her subsequent morning temperature:—

Subject.—Large mongrel bitch.
Virus.—Fresh liver, muscles and heart of horse—dead from horse-sickness fed to bitch.
Date.—March 6, 1911.

Date.	No. of Days.	Morning Temperature.
March 10, 1911	4	102·2 °F.
,, 11, ,,	5	101·8 ,,
,, 13, ,,	7	101·8 ,,
,, 14, ,,	8	102 ,,
,, 15, ,,	9	101·8 ,,
,, 16, ,,	10	102·4 ,,
,, 17, ,,	11	101·2 ,,
,, 19, ,,	13	103·8 ,,
,, 20, ,,	14	103·6 ,,
,, 21, ,,	15	104·2 ,,
,, 22, ,,	16	103·4 ,,
,, 23, ,,	17	103·4 ,,
,, 24, ,,	18	99·6 ,,
,, 25, ,,	19	101 ,,

Date.			No. of Days.		Morning Temperature.	
March	27,	,,	21	...	101·8	,,
,,	29,	,,	23	...	102	,,
,,	30,	,,	24	...	101·2	,,

N.B.—The period of incubation—13 days—is considerably longer than in Theiler's cases, produced by inoculation when it averaged from 5 to 7 days.

On the morning of March 19, thirteen days after eating the horse-sickness meat, the owner of the dog drew attention to its peculiar behaviour, fearing that it was developing rabies. The

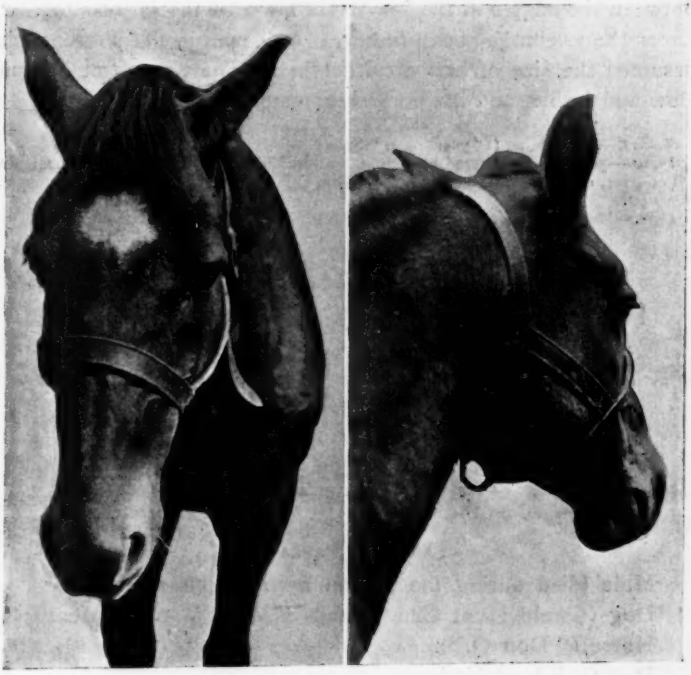

FIG. 2.

Photograph of horse "Saba," showing "Dik-kop."

animal was noticed to be excited, was snapping and rolling, and appeared to be suffering pain about the head. It frequently pawed at its mouth, from the corners of which escaped a thick saliva. This condition, while gradually improving, lasted for two or three days.

On March 21, when the temperature was at its highest, 30 c.c. of blood was taken from the dog, and, having been

citrated, was injected under the skin of the neck of the horse "Saba," a gelding some 15 years old, said to have recently come from the Orange River Colony.

On the sixth day after inoculation its temperature began to rise, and its orbital fossæ, hitherto very deep, began to fill. Day by day the symptoms of "Dik-kop" increased, the mucous membranes of the eye became almost claret-coloured, the lips and gums assumed a bluish red, a well-marked œdema accumulated between the angles of the jaw and obliterated the jugular furrow. Later the swellings above the eyes, well seen in the photograph, assumed the size of half a cricket ball. The heart-beat became slow and feeble, and the horse became extremely weak.

Subject.—Bay gelding (15 years old), "Saba."
Virus.—30 c.c. fresh citrated blood from half-bred bitch which, on March 6, 1911, was fed on liver, muscle, heart, &c., of horse "Don Q," dead of "dik-kop." Subcutaneous injection.
Date.—March 21, 1911.

Date.	Number of Days.	Temperature. Morning.	Evening.
March 22, 1911	1	99·4 °F.	—
,, 23, ,,	2	99·4 ,,	—
,, 24, ,,	3	100 ,,	—
,, 25, ,,	4	100·1 ,,	—
,, 26, ,,	5	100 ,,	—
,, 27, ,,	6	100·6 ,,	108·4 °F.
,, 28, ,,	7	102·2 ,,	108·8 ,,
,, 29, ,,	8	102·8 ,,	104·8 ,,
,, 30, ,,	9	103·8 ,,	105 ,,
,, 31, ,,	10	103·4 ,,	104·2 ,,
April 1, ,,	11	102·4 ,,	103·2 ,,
,, 2, ,,	12	101 ,,	—
,, 3, ,,	13	101·3 ,,	100·4 ,,
,, 4, ,,	14	99·4 ,,	—

Table of Passages.

Mule (died during inoculation by Theiler's method).
Dog (Gwelo Hunt Club hounds "Music" and "Mentor").
Horse ("Don Q.").
Dog (half-bred bitch).
Horse ("Saba").

Experiment to Test the Immunity of Gelding "Saba."

Virus.—2 c.c. of Theiler's virus 5383 injected subcutaneously.
Date.—April 19, 1911.

Date.	Temperature.
April 19, 1911	Inoculated
,, 20, ,,	99·2 °F.
,, 21, ,,	98·8 ,,
,, 22, ,,	98·2 ,,
,, 23, ,,	99·2 ,,
,, 24, ,,	98·8 ,,
,, 25, ,,	98·4 ,,

Date.				Temperature.	
April	26,	,,	...	...	98·6 ,,
,,	27,	,,	...	...	99·4 ,,
,,	28,	,,	...	...	99·2 ,,
,,	29,	,,	...	...	99·4 ,,
May	1,	,,	...	...	99 ,,
,,	2,	,,	...	...	99·4 ,,
,,	3,	,,	...	...	99 ,,

It will be remembered that Dr. Theiler reported in the "Report of the Government Veterinary Bacteriologist, Transvaal Department of Agriculture, 1905, 1906," certain experiments in which he sought to infect dogs with horse-sickness, and from which he drew the conclusion that:—

(1) It is possible to transmit horse-sickness into dogs and to transmit the virulency from dog to dog. Horse-sickness in dogs has a very rapid course both in incubation and temperature reaction.

(2) The *post-mortem* lesions found in dogs are identical with those of a horse.

Professor MacFadyean, recognizing the importance of the question "where in a horse-sickness district is the virus of the disease during the six or eight months which separate successive animal outbreaks?" carried out certain experiments with the object of obtaining further evidence as to the susceptibility of the dog to horse-sickness, using infective filtrate obtained by passing diluted blood through a Berkefeld filter in order "to exclude the effects of other things than horse-sickness virus which might be accidentally present in the blood," and injecting the virus subcutaneously in small quantities on the grounds that the intravenous method was non-natural, and that it was not desirable to use an excessive quantity of infective material or one much greater than is known to be sufficient for the infection of a susceptible animal. He also considered it possible that Theiler, when infecting horses with virus which had passed through a dog, did so by reason of part of the original virus remaining in dilution in the dog.

As a result of his experiments he drew the deduction that "in view of the resistance which the dog offers to experimental infection with horse-sickness virus, it is improbable that animals of that species are ever infected in natural circumstances, or that in horse-sickness districts the canine species can constitute a 'reservoir' for the infection of horses through the medium of an insect."

Subsequently Theiler conducted certain further experiments, passing the virus from dog to dog as far as the thirtieth passage. His experiments were so modelled as to eliminate MacFadyean's objections, who, in commenting upon them, concedes that "the new and more numerous experiments . . . . . will no doubt be generally accepted as proving that horse-sickness can be experimentally conveyed to the dog by inoculation.

The conclusion which appears to be warranted by the observation and experiments made in this country is that dogs may become infected in natural circumstances by feeding on infective meat.

The question as to whether "the canine species can constitute a 'reservoir' for the infection of equines through the medium of an insect" naturally follows and is now being put to experimental proof.

IMMUNITY.

Indexed B. A. L.

By A. C. DUNCAN, F.R.C.V.S.

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The efforts of modern medical treatment have been of recent years directed to a large degree towards prevention of disease, rather than purely curative with the aid of drugs. This is a rational outcome of increasing knowledge of the workings of Nature in the animal body.

The prevention of disease is attempted mainly along two lines, one which aims at producing an environment for animals living under artificial conditions, nearly approaching or simulating that which is found to exist in the case of animals living under healthy natural conditions, this is spoken of as hygiene. The other aims at the reinforcement of the natural powers of resistance to disease which are found to exist to some extent in all animals. This latter applies more particularly to specific organismal diseases, especially to those of bacterial origin. It is with the latter line of treatment that it is proposed to deal here.

It is noted in the first place that certain races, species of animals and individuals possess naturally an insusceptibility to certain specific diseases. This varies considerably in degree, and although in many cases infection appears never to occur naturally it may be doubted whether the insusceptibility or immunity is absolute. In the second place it is observed that animals not

naturally immune to a given disease nevertheless acquire a considerable degree of resistance to further infection after having been once subjected to an attack. This is so commonly observed, that certain infectious diseases of mankind are regarded as childish ailments, which it is rather beneficial than otherwise to have had. And the question "Has he had distemper," is one which is commonly asked by those who purchase young dogs.

Yet these diseases do at times recur, and while we in the western world regard some of them comparatively lightly, there was a time when they were veritable scourges; and there are instances to show that when they appear for the first time in a country they may cause great loss of life. For example, during an outbreak of measles in Fiji in 1876, D. H. Davies, writing in the *British Medical Journal*, says: "Out of 150,000 inhabitants, 40,000 were swept away." Again the same writer, referring to Samoa, says: "Until a few months ago measles had not entered this group. It was conveyed to Tonga, 500 miles south of us, by the New Zealand steamer 'Upolo' in June last, and from accounts we have received it nearly decimated the group." Again, in another group of islands, he estimated that 1,000 died out of 34,500. A very similar report was written of whooping cough in New Guinea.

Following these observations, immunity to certain diseases has been produced artificially in various ways.

Induced immunity has been described as being active or passive. Active immunity is produced when bacteria are inoculated into the subject, producing, it is believed, an active reaction on the part of the body tissues, and passive immunity when some of the blood serum of an animal previously actively immunized is injected into the animal to be protected.

In the earliest cases of artificially produced immunity an attempt was made to produce a mild attack of the specific disease by the former method. It was observed that an attack of cow-pox, which was thought to be similar to but less virulent than human small-pox, produced a degree of immunity to the latter disease. Consequently an attack of the milder disease was deliberately induced by transference of virulent material.

Later an attempt was made to produce a disease milder in type by attenuating the organism by heat. The methods of Pasteur for the production of anthrax vaccines afford a good

example. Still later modifications of these methods of producing immunity were introduced. The virus was attenuated by drying, by prolonged artificial cultivation, or by passage through certain animals. Combined inoculation of immune serum and virus has also been practised.

Some of these methods were at first based on observation of results. But for a considerable period research has been carried on by various investigators with a view to the discovery of the actual causes which give rise to natural immunity.

One of the earliest phenomena brought to light in this connection was the phagocytic power of certain leucocytes; indeed, at first sight this would appear to offer a complete and satisfactory explanation. The leucocytes had been seen actually destroying the bacteria, and Metchnikoff showed that they (the bacteria) actually disappeared. He and his followers were therefore satisfied that this power alone was sufficient to insure natural immunity.

About this time, however, it was shown that in the blood serum there existed substances which, even when the phagocytes were removed had the power of negativing bacterial toxins. But Metchnikoff still believed that phagocytes were the real element of protection, that the substances found in the serum were merely overplus products of leucocytes and that they played but a small part in the warfare against bacteria. He said again, "There is only one constant element in immunity, whether innate or acquired, and that is phagocytosis." Later, however, he somewhat moderated his views as far as acquired immunity was concerned, and suggested that acquired immunity was a different power from that which was inborn.

The view of Wright or the theory of opsonins is closely related to the views of Metchnikoff. In this opinion, although the actual work of destruction of bacteria is attributed to the phagocytes, these are said to be practically unable to overcome bacteria unless aided by the opsonins, found in the blood serum. And the measure of phagocytic power is the increase or decrease of opsonins in the serum.

That both of these views include a considerable amount of truth seems undoubted. That leucocytes appear to be active agents in protecting the body against microbic invasion and that there exist in the serum other active agents contributing to the

same work seem equally clear. Moreover, it has been shown that there are substances in the serum which themselves can negative the action of toxins.

What these various substances in the serum are has been the subject of much controversy and much research, and although a great deal of light has been thrown on the matter, still the exact causes of natural immunity are far from clear.

So far as the action of serum is concerned, the views of Ehrlich are most generally accepted at present. Briefly they include the following important points: That certain substances, including bacteria, when injected into the body, give rise to the production of other definite antagonistic materials which have affinities (allied to chemical affinities) for and reactions with the substance injected. That the antigen, or substance injected, gives rise to a specific anti-substance, *i.e.*, one having affinities for itself alone and probably for no other antigen.

The anti-substances produced are of different types. First, an anti-substance which simply combines chemically with the antigen, *e.g.*, an antitoxin. Second, an anti-substance which combines and at the same time produces a physical change, *e.g.*, the production of a precipitate. Third, a substance which, by combining with the antigen, leads to the union with it of another material which has been called the complement, and which is believed to be naturally present in the serum. As a result of the union of the complement a bacteriolytic or hæmolytic action (according to the nature of the antigen) is produced.

Ehrlich has, in a very interesting manner, described his views graphically in what is now well known as his side-chain theory, in which the cells of the body are shown as possessing receptors which are primarily intended for the absorption of food. Whatever be the exact truth of all these views, they have certainly given rise to practical and far-reaching results, *e.g.*, in the use of immunizing sera, the estimation of the opsonic index, and in diagnosis by the use of Widal's or the agglutination reaction.

Regarded, however, from an academic standpoint, some authors and investigators are not inclined to wholly accept the views of Ehrlich. Reid, for example, in a critical review of the subject, seems to regard them as fanciful, incapable of proof, and contrary to our knowledge of the working of Nature elsewhere. He says: "It is improbable in the last degree, that the

animal body is a species of magic bottle, instantly capable of producing at need highly complex chemical substances, the antitoxin, which exactly neutralize other equally complex substances, the toxins, the right antitoxin at the right time; or that each toxin contains or is capable of being converted into substances chemically antagonistic to itself and to no other toxin. If this happens, it is a fact unique in Nature, nothing else like it is known to occur."

Reid, in the same work, endeavours to show that immunity is a normal physiological reaction, and that "acquired immunity is part of the general power of making useful acquirements in particular directions which is possessed by all the higher animals: that the habituation is by way of weak toxins to strong toxins." He suggests that the result is brought about by the digestion of toxins, so that there are present in the animal's blood, toxins in all stages of attenuation.

In each of the foregoing theories there would appear to be the truth, yet not the whole truth, for while each is supported by strong proof, in each case there has also been adduced strong evidence of insufficiency.

If any one of these theories were wholly correct, then we should expect to be able with comparative certainty to induce immunity to any disease of which the causal organism were known by the particular method suggested. Yet how different is the actual case. Out of a very large number of attempts at the production of immunity, but a very few have given anything like certain results, some are erratic, while others have proved of but little effect.

The writer would offer the proposition that the causes of immunity, natural and acquired, are not to be found in any one or two elements in the body, but in a large number of correlated factors, some of which have been carefully worked out while others have received but scant attention. This would account largely for the inequality of results obtained, markedly successful in some cases and inefficient in others.

In addition to the theories alluded to above, the factors of use, acquirement, and natural selection, alluded to by Reid, probably play a most important part.

This phase of the question is a very wide one and still very obscure, but it is worthy of consideration.

The process of stamping out contagious diseases in animals which has proved so successful in modern times may possibly tend to obscure from our observation the effect of natural selection in disease among the lower animals. But in man we find a tendency to freedom from certain bacterial diseases in older countries, or at any rate a considerable reduction in virulence in spite of increase and crowding of population, which must in part at least be due to what we may for the present term hereditary acquirement.

In the vegetable kingdom we find a somewhat analogous condition which may be helpful in our considerations regarding animals. The breeding of plants immune to certain plant diseases has passed beyond the merely theoretic stage. An example is seen in the breeding of rust-immune wheats on Mendelian principles. Here we must look beyond the fungicidal action of plant cells for the explanation of the immunity.

An allied factor is the variation in the virulence of the organism; and this consideration raises afresh the whole question of the identity of specific pathogenic micro-organisms.

When so much has been learned, after years of toil by our wisest investigators, it is difficult to return so far along the line; but if we have proceeded along side-tracks to various truths and find a difficulty in correlating them, the safest plan will be to return and see where, if anywhere, we have diverged from the broad highway of biological principles.

We may safely assume, as has been said, that the pathogenic organisms have reached their present mode of life by a long process of evolution from saprophytic ancestors, otherwise we should be driven to conclude that they had arisen spontaneously or else as an integral part in the evolution of primitive man. These pathogenic organisms adapted themselves to a parasitic mode of life. Some of them even now can return to a saprophytic existence if necessary, as, for example, the tetanus bacillus. Others have greater difficulty in resuming ancestral habits. From comparatively few there have evolved large numbers. That some of these may be merely variations of earlier types adapted to new environment is at least worthy of consideration. The possibility becomes clear when we consider the history of a few of the known pathogenic bacteria.

The tubercle bacillus was found in somewhat similar lesions in various animals, but owing to variations in morphology, growth on media and susceptibility of experimental animals, a

dual or multiple character was assigned, some distinguished between avian and all others, some separated the bovine type. But it is seen that nearly all bacteria vary in some or all of these characters under different environments, in artificial media especially, then why not in a living host, and it was found in the case of the tubercle bacillus that after a time it would adapt itself to growth in media living and artificial which were considered before as incapable of nourishing it.

And the tendency to consider the different varieties as similar or very close relations grew. We read some years ago the idea expressed by Straus that "the differences between the two bacilli are certainly very striking, but is it not possible that there may be transition forms between the two bacillary varieties? In other words, are not the two bacilli merely races of the same organism and not actually distinct species?" This view, of course, is now widely held.

Again the bovine race was formerly considered to be immune to the glanders bacillus, but experiment has shown that after some trials this organism may adapt itself to life in a bovine medium.

The inference is that we may find a closer relationship between hitherto distinct diseases of men and animals which may aid us in the consideration of the production of immunity in each case.

REFERENCE TO AND QUOTATIONS FROM THE FOLLOWING WORKS.

METCHNIKOFF. "Immunity in Infectious Diseases."
REID. "Principles of Heredity."

SOUTH AFRICAN PATHOGENIC TICKS.*

Indexed B. A. I.

BY H. E. LAWS, B.Sc., F.I.C.
The Cooper Laboratory for Economic Research, Watford.

WHILST working on the subject of ticks and their eradication in South Africa the writer has often had occasion to refer to publications and general literature in connection with this work in order to refresh his memory on different points regarding the life-history of the various species of ticks, and the periods of incubation of the disease which they transmit.

Before obtaining the information desired it has often been

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* From the *Agric. Journ. of the Union of South Africa.*

TABLE I.—RELATIONSHIP BETWEEN DISEASES AND THE SOUTH AFRICAN PATHOGENIC TICKS WHICH TRANSMIT THEM.

Disease	Causative organism	Incubation period	Susceptible Animals	Duration of infectivity in recovered animals	Species of ticks transmitting infection	Geographical distribution	Hosts	Moults	Phase of life-history of tick at which disease is transmitted
Redwater	*Piroplasma bigeminum*	17—18 days	Cattle	12 years and more	*Boophilus decoloratus* (the blue tick)	South Africa to Central Africa	Cattle; other domestic animals occasionally	1st, on 2nd, on } host	Larva
					Rhipicephalus appendiculatus (the brown tick)	Ditto	Cattle; horses; other domestic animals; antelope; hare; &c.	1st, off 2nd, off } host	Ditto
East Coast Fever	*Piroplasma* (*Theileria*) *parvum*	10—20 days	Ditto	Non-infective after recovery	*Rhipicephalus appendiculatus*	Ditto	Ditto	Ditto	Nymph and adult
					Rhipicephalus capensis (the Cape brown tick)	South Africa	Cattle and other domestic animals	Ditto	Ditto
					Rhipicephalus simus (the black-pitted tick)	Africa	Cattle and other domestic animals; wild animals	Ditto	Ditto

TABLE I.—(*continued.*)

Disease	Causative organism	Incubation period	Susceptible Animal	Duration of infectivity in recovered animals	Species of ticks transmitting infection	Geographical distribution	Hosts	Moults	Phase of life-history of tick at which disease is transmitted
East Coast Fever (*continued*)					*Rhipicephalus evertsi* (the red tick)	Africa	All domestic animals, excepting pig; many wild animals	1st, on 2nd, off } host	Adult
Gall-sickness	*Piroplasma mutans*	3—4 weeks	Cattle	Infectivity retained after recovery	*Rhipicephalus appendiculatus*	See above	See above	See above	Nymph and adult
					Rhipicephalus simus	Ditto	Ditto	Ditto	Ditto
					Rhipicephalus evertsi	Ditto	Ditto	Ditto	Adult
Spirochætosis	*Spirochæta theileri*	—	Cattle, Horse, Sheep	Ditto	*Boophilus decoloratus*	See above	See above	See above	Larva
					Rhipicephalus simus	Ditto	Ditto	Ditto	Nymph and adult
Biliary fever of horse	*Piroplasma equi*	—	Horse	Ditto	*Rhipicephalus evertsi*	Ditto	Ditto	Ditto	Adult
Malignant jaundice of dog	*Piroplasma canis*	—	Dog	Ditto	*Hæmaphysalis leachi* (the Cape-dog tick)	Africa, Southern Asia, Australia	Dog	1st, off 2nd, off } host	Ditto
Heartwater	Unknown	About 15 days	Sheep, Goats, Cattle	Non-infective after recovery	*Amblyomma hebræum* (the bont tick)	South Africa to Central Africa	All domestic and many wild animals	Ditto	Nymph and adult

* Dönitz, W. (1910), "Die Zecken Südafrikas," p. 430.

TABLE II.—PERIODS OCCUPIED BY THE VARIOUS PHASES OF THE LIFE-HISTORY OF SOME SOUTH AFRICAN PATHOGENIC TICKS.

Species	Dropping off of replete female to egg-laying	Time from egg-laying to hatching out of larvæ	Time larvæ can exist without feeding	Time to dropping off of larvæ on repletion	Time on ground for first moult.	Time to dropping of nymph on repletion	Time nymph can exist without feeding	Time on groun for second moult	Time adult can exist without feeding	Time to dropping of adult females on repletion.
Boophilus decoloratus (the Blue Tick)	5 days or more according to season	3—6 weeks more in winter	6 months	—	—	—	—	—	—	3 — 4 weeks from commencement of larval feeding.
Rhipicephalus appendiculatus (the Brown Tick)	6 days	28 days to several months	7 months	3—8 days	About 21 days	3—7 days	6½ months	About 18 days	9½ months	4—7 days
Rhipicephalus nitens (the Shiny Brown Tick) *	—	—	—	—	—	—	—	—	—	—
Rhipicephalus capensis (the Cape Brown Tick) *	—	—	—	—	—	—	—	—	—	—
Rhipicephalus simus (the Black-pitted Tick) †	—	About 30 days	—	—	About 20 days	—	—	About 25 days	—	—
Rhipicephalus evertsi (the Red Tick)	—	About 30 days	7 months	—	—	—	—	About 24 days	1 year	—
Amblyomma hebræum (the Bont Tick)	2 weeks to more than 3 months	10 weeks to 10 months	7 months	4 — 20 days mostly from 5—7 days	About 25 days to 4 months	4—20 days	6 months	25—160 days	7 months	10—20 days

* Life cycle resembles that of *Rhipicephalus appendiculatus*, according to Theiler.
† *Rhipicephalus simus* usually feeds on small wild animals during its larval and nymphal stages.

found necessary to read through an enormous number of papers, which obviously involves a great waste of time, beside being extremely laborious. In order to avoid as far as possible this unnecessary labour it has occurred to the writer—and no doubt other workers have found the need for it too—that it would be a tremendous assistance to those interested in the subject of ticks, both professionally and as practical farmers, if tables were compiled giving the more essential points in connection with the habits and life-histories of ticks and the diseases which they transmit, so that one can refer to them without finding it necessary to read through an enormous amount of detail before arriving at the actual information required.

The writer has discussed this with Mr. Robinson of this Laboratory, and the latter has been good enough to draft two tables, No. 1 showing the relation between South African Pathogenic Ticks and the diseases which they transmit, No. 2 showing the periods occupied by the various phases of the life-history of some South African Pathogenic Ticks.

In order that the tables may be of service to the practical man, as well as others, Mr. Robinson has inserted the popular names of the diseases as well as those of the ticks which transmit them.

ROYAL (DICK) VETERINARY COLLEGE, EDINBURGH.

At a recent meeting of the Board of Management of the Royal (Dick) Veterinary College, Edinburgh, it was intimated that the purchase of a site for new college buildings had been concluded. The site, extending to about one and a half acres, is on the east side of the Meadows, and within easy reach of the University. The cost of the new buildings, which will be commenced without undue delay, is estimated at £50,000.

DEATH OF SIR RUBERT BOYCE, F.R.S.

We regret to announce the death of Professor Sir Rubert Boyce, which occurred suddenly at Liverpool, as the result of an apoplectic seizure. Sir Rubert was an excellent friend to the veterinary profession and it was mainly through his instrumentality that the Veterinary School of the Liverpool University was established.

Clinical Articles.

PARTURIENT LAMINITIS SUCCESSFULLY TREATED WITH ADRENALIN.

By P. R. THOMPSON, M.R.C.V.S.
Market Harborough.

The subject of this note was a strong hunter brood mare, about 12 years old. She had been lent to a farmer to assist in the hay field.

Next day she showed signs of uneasiness and colicky pains and I was sent for. On my arrival I found her to be six months' pregnant to the thoroughbred sire "Blankney," and that she was about to abort. I therefore delivered the fœtus. I revisited her in the evening and found the fœtal membranes retained and the uterus half prolapsed. The latter fact made it impossible to remove the membranes completely, so I ligatured them as high up as possible, cut off the soiled portion, and replaced the prolapsed uterus, after disinfecting it. This was about midnight. I revisited her at 9 a.m. She had retained her uterus and I had little difficulty in removing the remaining cleansings, after which I syringed her out with hydrogen peroxide solution, and left her quite comfortable.

When I returned to her in the evening, laminitis was commencing in her fore feet. She was blowing somewhat, standing on her heels, plantar arteries throbbing, and she would not allow either foot to be raised. Temperature 103.4° F. Having read in the Veterinary Journal of the successful use of adrenalin, I decided to use it, and injected 3 cc. (50 m.) of adrenalin chloride solution, 1-1,000, diluted with an equal quantity of sterile water at two points of each coronet, about an inch above the hoof. The mare also received magnes. sulph. lb. ss. in a mash, and quinine sulph. ʒiss. in bolus.

Next day the improvement was quite surprising. I intended to repeat the adrenalin, but she moved about so well and strongly objected to her foot being held, that I was unable to do so. In four days recovery was complete.

[It will be noted that Mr. Thompson injected the adrenalin into the coronet, whereas in previous reports it was injected at

the fetlock over the digital artery. It will be of interest to compare with other cases to see if one seat of injection produces better results than the other.—Eds. *V.J.*]

PROLAPSE OF THE RECTUM IN A HORSE.

By G. MAYALL, M.R.C.V.S.
Bolton.

I was called to a chestnut cart mare on June 11 that had "put her seat out." On arrival found half a foot of the rectum out with a greatly tumefied mucous membrane having a breach or crack in it about 3 in. in length on its upper surface. The mare's bowels had been loose during the previous day, but otherwise no noticeable signs of any disturbance of health had been shown. I bathed the protrusion carefully and thoroughly with a cold solution of sulpho-carbolate of zinc, using balls of surgical wool to do this. I then procured some castor oil which the owner had handy, and anointed the swelling all over with it. Proceeding to effect reduction I found the operation rather more difficult than I anticipated, but after gentle kneading I somewhat reduced the size of the protrusion, and working at the top edge of the swelling I managed to get a little of it back, and by pressing and pushing in the bottom of the eversion with my left hand I gradually effected reduction with my right. Having returned the bowel I carried tampons of wool soaked in sulpho-carbolate of zinc well into the rectum and then squeezed them out when I got them through the anal opening. The mare strained a good deal, and once or twice I expected to see that my labour had been in vain, but the bowel was not put out again, and I fastened the mare's tail down over her anus and vulva and told the owner to keep it fastened down for twelve hours. The mucous membrane of the rectum was very fragile, resembling in friability that of an inflamed liver, so that it was impossible to return the bowel without damaging its internal lining somewhat. After reduction and swabbing with the antiseptic, blood and the lotion were voided. I gave ½ oz. of chloral as a draught to allay straining. The after-treatment consisted in 2 oz. injections into the rectum three times daily

of hazeline and alum solution equal parts. Linseed mucilage has been given with all the food, manual help has been given to the mare when dunging, and she has recovered sufficiently to go to work again.

Canine Clinical Note.

ACCIDENTS.

By G. MAYALL, M.R.C.V.S.
Bolton.

If motor cars hit us in one direction they bring us patients in another. A Schipperke struck on the head and knocked yards was brought to me in a comatose state suffering from concussion of the brain. He lay prostrate and moaning. I gave him 2 doses of sal volatile in six hours space of time, and told the owner I had slight hope of his recovery. He was brought in at five o'clock, and at eleven was just lifting his head up; in the morning he was walking about with the whites of his eyes as red as those of a demon in a pantomime. He had some pot. iodide afterwards, and made an uninterrupted recovery. A fox terrier was run over by a motor car across his fore ribs and back. He bled from his mouth. Gave him a purgative dose of medicine and hot flannels and liniment to his thorax, and he recovered. A third dog run over across the loins only exhibited soreness for a day or two. A Scottish terrier run over by a lorry was brought to me passing blood in his urine. Gave him a chloretone capsule followed by doses of hazeline and kept him on milk diet only, and he made a good recovery in a week.

A cat fell into a bucket of whitewash, which was sponged off with warm water immediately after it occurred, and after a few days discomfort he got all right. The same cat was run over by the wheel of my trap, which went right over him, and beyond stiffness for a day or two he showed nothing abnormal. A fox terrier fell into a bucket of whitewash; nothing was done, and I was called in to see him three days after the accident. His hind legs and genitals were excoriated and inflamed, his anus was severely burnt and he had evidently taken a quantity of lime internally. I sponged him and dressed him with boric ointment. He lived about a week and then died. Early removal of whitewash by sponging off with warm water is indicated in these cases.

PROLAPSE OF THE RECTUM IN A DOG.

By G. MAYALL, M.R.C.V.S.
Bolton.

On May 1 an Aberdeen terrier (an old patient here) was brought in at 11 o'clock at night with his rectum out about 5 in. After bathing with cold water I effected reduction and gave a chloretone capsule and an injection of equal part of hazeline and cold water. He went on all right on a milk diet until June 4 when he again everted his bowel. I returned it and gave him injections of hazeline and cold water twice daily for six days. During this time he passed large quantities of matted hair of the colour and length of his own coat, and was fed on barley water and milk. On June 10 his fæces were quite normal and passed without the usual straining visible heretofore. As internal medicine he had a chloretone capsule daily. He was discharged cured on June 10, and as he lives quite close to I have observed him many times since, and he seems quite comfortable and happy.

PYÆMIA IN A DOG.

By GEO. H. WOOLDRIDGE, F.R.C.V.S.
Professor in the Royal Veterinary College, London.

On June 12, a five months' old Irish terrier was brought to the College Clinique for treatment for a swollen throat and head. On examination the sub-parotideal lymphatic glands of both sides were found to be very swollen, and the subcutaneous tissues of the head were œdematous, giving quite a curious appearance. One gland showed a fluctuating protrusion about the size of the point of the finger. It was lanced and a quantity of creamy pus was evacuated. The puppy was off his feed and the bowels irregular with a tendency to diarrhœa. I prescribed massage and local fomentation with chinosol solutions, and internally bismuth carb. salol and tannoform in suspension with Emuls. petrol, and Ext. malti liquidus. The dog was treated as an out-patient.

He was brought back again a week later and presented a very miserable spectacle. He was able to retain a very little liquid food, egg and milk, and beef juice. He was very thin and weak and the superficial abscesses had become very numerous

and almost all bilateral. They were situated one in each prescapular region, one in each axilla, one in each groin, one behind each thigh, one on each side of the base of the tail, one on each side of the dorsal vertebræ; the only single ones being one on the poll and one on the left angle of the haunch. Most of them had burst and discharged creamy pus. The œdema of the head had subsided.

The local treatment with chinosol 1-500 was continued and the same medicine *per os* with the addition of Tr. nucis vom. m.i. three times daily. Nuclein solution, as supplied by Parke, Davis and Co., was also injected subcutaneously in dose of 2 cc., and the patient allowed home to be nursed. From that point the improvement was very manifest. The patient became brighter and took his limited nourishment, to which virol was added, quite readily. The abscess cavities gradually ceased discharging and no new abscesses developed. On being brought again a week later the improvement was most manifest. The patient was very bright and lively and had put on considerable condition. The abscesses had all ceased discharging and had practically healed, a scar showing their former position. A further dose of nuclein was injected, a course of tonics prescribed, and the patient was discharged.

Remarks on the Use of Nuclein.—In this case the commencement of recovery was obviously coincidental with the administration of the nuclein, and I have no hesitation in attributing the success of the case largely to its assistance. I have now used nuclein in canine practice in a very large number of cases, and regard it as a very valuable adjuvant to our other medicinal agents. I recommend it in most catarrhal affections, whether contagious or not, to be used not as a substitute for other lines of treatment, but in addition to them. Moreover, I have had far better results when given hypodermically than when given *per os*.

Abstracts.

SOME CONSIDERATIONS ON THE ABSORPTION AND EXCRETION OF DRUGS.*

By Professor W. E. DIXON, M.A., M.D., F.R.S.

Professor of Materia Medica and Pharmacology, King's College; Lecturer on Pharmacology, Cambridge University; Examiner in Pharmacology and Materia Medica, London University; Examiner in Pharmacology, Cambridge University.

There is no subject in pharmacology upon which our knowledge is more limited than that which deals with the absorption and excretion of drugs. Why is it that chlorides should be absorbed so readily from the alimentary canal, whilst sulphates are refused admission into the body? The answer is at present unknown, yet in many instances it is just such facts as these which are at the basis of the action of drugs. It is permissible to prescribe the sulphate of iron quite freely by the mouth, because it is known that only a trace of what is administered will be absorbed; indeed, were it all absorbed there would not be so much difference between the specific toxicity of this substance and corrosive sublimate. Or, to take another example, were one-tenth part of the usual dose of Epsom salts absorbed into the system severe cardiac symptoms would result.

A great many drugs are given on the assumption that they are not absorbed, and with the object of producing local and reflex effects, yet in these instances, if absorption should occur, evil effects must ensue. The vegetable purgatives afford an example; they contain irritant principles which excite the alimentary canal and induce reflex peristalsis; if for some unusual cause they are absorbed they give rise to renal symptoms and sometimes to nephritis. It is for this reason, among others, that it is advisable to prescribe these drugs in the impure state—that is, with their natural gums and resins—since contamination with such bodies is well recognized as delaying absorption. Extract of aloes is much less likely to be absorbed than aloin, and it is for the same reason that the new synthetical purgatives derived from anthraquinone, and which contain the same chemical nucleus as the active ingredients in rhubarb, senna, aloes, and cascara, are a failure. The pure substance is liable to become absorbed, and, in addition to purgation, backache, pain, albuminuria, and other renal symptoms are liable to occur. Anthelmintics and emetics, also, are drugs deliberately chosen for their local action, and not for specific effects after absorption. Many of our best expectorants act in this way; ammonium carbonate, ipecacuanha, senega, and quillaia will serve as examples; they, of course, increase the flow of bronchial mucus by exciting the nerve endings in the stomach and so affecting the bronchioles reflexly through the medulla.

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* From *The Practitioner*.

If it is desirable that the whole of a dose of some drug shall be absorbed into the system, one plan is to inject subcutaneously, and it is not, as has been stated, a matter of indifference as to where the injection is made. Much evidence has accummulated to show in these cases that the drug diffuses from the seat of inoculation through the tissues much in the same way as rings on a pond form as the result of disturbance. The subcutaneous injection of a local anæsthetic such as cocaine shows this perfectly; the anæsthesia, profound at the seat of injection, gradually fades as the distance from this point increases. So that an injected drug produces a pronounced effect on the tissues in the neighbourhood of inoculation as the result of diffusion, and a much smaller effect on distant tissues, since the drug will only reach these through the circulation after absorption.

If strychnine, which acts upon the retinal nerve cells of the eye, be injected (1/30 gr.) into the temporal region of a man, the eye on that side is affected; the field of vision, especially for blue, is enlarged and the acuity of vision is increased, but the opposite eye is hardly influenced. This effect must be due to direct diffusion of the drug to the eye, as if it reached the eye through the circulation both eyes would be equally affected. It would, of course, be of no use to inject morphine locally into a tissue to relieve a localized pain, since the seat of action of morphine is on the sensory cells in the brain; the local application of morphine in all such cases is based on fallacy and is useless. It is not, therefore, a matter of indifference where a drug shall be injected when it is desired to induce a specific effect. Even when only rapid general absorption is aimed at, with the object, let us suppose, of acting on the circulatory system, the seat of injection is still important. One example will suffice to make this clear. Tyramine is the principal active constituent of the liquid extract of ergot; this amine, when injected into the left forearm of a man (dose 30 mgr.), raised the blood-pressure from 122 to 128 mm. of mercury; but the same dose injected round the cellular tissue in the region of the clavicle on another occasion raised the blood-pressure from 122 to 138 mm. It would appear then to be rational to inject our drug under that portion of the skin as near as possible to the organ or tissue upon which it is desired to act, and where a rapid action is desired to choose some loose cellular tissue.

Many drugs are quite ineffective in their action when taken by the mouth. Calcium salts are only absorbed in healthy people with difficulty and very slowly, so that the calcium content of the blood is hardly altered by taking chalk, calcium lactate, or any other calcium salt by the mouth. Potash and ammonium salts also fail to exhibit their specific actions when administered orally, in spite of the fact that they are very readily taken up into the system. It is well known that potassium in excess is a profound poison to all living tissue, and that ammonium salts in the blood cause convulsions by acting on the medulla. Nevertheless, these drugs may be taken, for all practical purposes, in unlimited amounts without causing these effects. The amount of potash salts taken

daily by the vegetarian far exceeds anything ever prescribed by the physician. Potassium and ammonium salts owe this absence of toxicity to their property of easy excretion; the rate of excretion can exceed that of absorption, so that the amount of the drug in the tissues is not perceptibly increased by the oral administration. The specific effects of these drugs can, however, be obtained by injecting them when the rate of absorption exceeds that of excretion.

Adrenalin is another drug which exerts only a local action. If it is taken by the mouth it constricts blood-vessels locally in the alimentary canal and during the process is destroyed. When injected subcutaneously the same effect occurs, and a large patch of white skin is induced, but the specific effect of the drug on the heart and other viscera is not generally present because the adrenalin is oxidized before it can be absorbed.

With some drugs considerable delay occurs even after absorption before the desired specific action is obtained. This applies to digitalis and colchicum. Digitalis, after absorption, is slowly taken up by the muscular tissue, especially that of the heart, and it is not perhaps, till several hours have passed since the introduction of the first dose of digitalis that the patient is under the maximum influence of that dose of the drug. It is for this reason that the treatment of pneumonia by cardiac tonics is commenced early, so that, should the heart commence to fail, it may be already under the influence of the drug. Squill possesses many advantages over digitalis as a cardiac tonic, but as usually administered by the mouth a smaller proportion of it is absorbed, and, further, it is somewhat more irritant, so that it has come to be employed almost entirely as an expectorant.

Before leaving this question of absorption it may be pointed out that some drugs, such as the local anæsthetics, are injected subcutaneously for their local action. It is obvious that these drugs should possess (1) a low degree of toxicity in proportion to their anæsthetic power; (2) solubility in water, besides being capable of sterilization by boiling; (3) non-irritant properties; and that they should be capable of (4) combination with adrenalin. One object of the last axiom is that absorption by the general circulation may be delayed whilst diffusion into the surrounding tissues shall remain normal. Other things being the same, a drug which is absorbed more slowly into the general circulation after hypodermic injection possesses distinct advantages over the more quickly absorbed drug.

Widely different experiments, performed both in Germany and in this country, have shown that two of the best drugs at present available which best answer the conditions enumerated are novocaine and stovaine, and both are largely substituted for cocaine. Novocaine is less toxic and less irritant than stovaine, but, weight for weight, it has not such marked anæsthetic properties. Nevertheless, the specific action of stovaine on nerve fibres is less than that of novocaine, since stovaine destroys other tissues besides nerve fibres.

Even when the rate of absorption of a drug from the alimen-

tary canal is well known, we are still not in a position to state the amount of specific action it will exert, since degree of specific action depends largely upon the amount present in the blood at any one time, and, as has been pointed out, potash and ammonium salts are excreted so rapidly in the urine that their specific effects are wanting. Other substances may be destroyed or altered in the body so as to lose their specific effect. For example, half an ounce of alcohol taken by the mouth, suitably diluted, has no specific action in the body, since it is oxidized completely before sufficient can accumulate in the tissues to exert an effect. The same dose, however, injected under the skin would affect the central nervous system for such time until its oxidation was effected.

Salicylic acid, as is well known, combines in the body with glycocoll, and this renders it inactive; the resulting salicyluric acid is almost non-toxic, and patients suffering from acute rheumatism treated with this body derive no benefit. Derivatives of benzene formed in the alimentary canal as the result of putrefaction are absorbed and excreted in the urine combined with sulphates, which combination greatly facilitates their excretion in the urine, and probably in this way diminishes their toxicity. Nearly all mammals, except man, convert their relatively insoluble uric acid into the much more soluble body allantoin. Man unfortunately does not, and so this non-toxic, though relatively insoluble, substance, uric acid, has been credited with causing every imaginable evil.

A group of drugs which has attracted a great deal of attention in modern times is the organic compounds of the metals. Those of iron and arsenic are perhaps the most important members, and these are given with the object of being absorbed. The organic compounds of iron possess certain advantages over the inorganic; they are not astringent; that is, they have no power of precipitating proteins in the alimentary canal, and therefore do not upset digestion to the same extent as the soluble inorganic bodies. But it must be remembered that the combinations of iron with protein, such as the ferratin of Schmiedeberg, or one of the products prepared from blood, require to be digested before the iron they contain can be absorbed. Furthermore, experimental therapeutic investigations have shown quite clearly that patients suffering from chlorosis improve, as regards the percentage of hæmoglobin in the blood, quicker when they are taking one of the ferrous carbonate preparations than one of these organic preparations. In this connection it must be noted that chlorosis is iron starvation. Iron is not being absorbed from the alimentary canal; whether this is due to sulphides, as suggested by Bunge, or to other causes, is a matter of some importance, for if chlorosis is caused by sulphide, then iron salts act in two ways; they remove sulphide from the bowel by forming the insoluble ferrous sulphide, and they provide an excess of iron for absorption.

The organic preparations of iron placed on the market up to now have proved inferior to the inorganic preparations, when

comparing the rates at which the two groups possess the power of increasing hæmoglobin formation. With regard to the organic preparations of arsenic, however, the tale is different, since, unlike the iron compounds, they are readily absorbed. These compounds, so long as they retain the molecular form—that is, so long as the arsenic forms an integral part of the molecule—are non-poisonous in so far as arsenical action is concerned.

The fact of combining arsenic in an organic compound with a carbon atom is to deprive the compound of arsenical action. This is more commonly expressed by saying that arsenical action depends upon the presence of AsO_3 or AsO_4 ions, and unless these can be liberated in solution from a compound, that compound must be without arsenical action. If, for example, arsenic were combined with an aniline derivative, the new body, acting as a whole, would possess an aniline action, but not an arsenical action, since in solution arsenic ions are not set free. It is necessary, therefore, to consider how it comes about that these bodies should have assumed so important a *rôle* in modern therapeutics and how they produce an arsenical action. The cacodylates are perhaps the simplest of these bodies $(CH_3)_2AsOOH$. They are almost non-poisonous, and pass, for the most part, through the body unchanged; a small percentage, however, is oxidized, and from this the arsenic is set free in ionic form; so that, if such a drug be taken for some weeks, this trace of arsenic exerts a mild arsenical action. Atoxyl is an aniline derivative which contains about 24 per cent. of arsenic, and yet it possesses only about one-fortieth the toxicity of arsenious acid. It has been used largely in the treatment of syphilis, sleeping sickness, and other protozoal diseases, but has now almost ceased to be used on account of its poisonous action on the sense organs and kidneys. The greater part of this substance after absorption is excreted in the urine unchanged, but a small amount is undoubtedly broken up in the body, and this oxidized portion would liberate its arsenic, which should then be free to act in the ordinary way.

The last of these bodies, dioxy-diamido-arseno-benzol, the latest specific of Ehrlich, is alleged to exert an even more powerful specific action on the organisms of syphilis, relapsing fever, and other diseases than the atoxyl group of drugs, and to be less poisonous than these.

Now all these amido-arseno-benzol derivatives, in so far as they are not broken up in the body, exert an action like the members of the coal-tar series, such as amido-phenol; but a portion of each dose is oxidized in the body and the arsenic of this portion is free to exert its specific effect. Yet a mixture of arsenious acid with a suitable coal-tar derivative administered to patients is far behind such a drug as atoxyl in curative power in syphilis, trypanosomiasis, or other protozoal diseases. Only one explanation appears to meet these facts, and, to make clear the extraordinary toxic action these bodies exert on parasites—namely, that the parasites, directly or indirectly, are enabled to break down the molecule, and so to liberate the arsenic in ionic

form and the benzine derivative respectively. The ionic arsenic being set free in the neighbourhood of the organism in a relative degree of concentration, and being very toxic to protozoa, is enabled to destroy them.

If this be the correct explanation of the mode of action of such bodies, it affords us every hope for the future treatment of all diseases caused by organisms. Mercury, for example, destroys most living organisms, but it cannot be employed to destroy living organisms in the body, since, after absorption, it destroys the tissues of the body before the organisms, or, in other words, the organisms are more resistant than the tissues. If, however, the mercury could be combined with some organic body, which would, of course, render it non-poisonous, and if this compound were of such a nature that it could be split up by organisms, cocci, bacteria, and the like, so as to liberate the mercury locally in relative concentration, a chance would then certainly be afforded of destroying active disease by means of drugs given in medicinal doses.

When a drug exerting a well-defined action has been absorbed into the system, conditions may arise which modify or influence the degree of its action. To illustrate this, reference will be made to the drugs which are commonly employed to exert an antiseptic action on the genito-urinary system. The degree of acidity of the urine exerts a considerable effect both on the growth of organisms in urine and on the power of action of antiseptic drugs. Acidity exerts a restraining influence on the growth of organisms in proportion to its degree. But *Staphylococci* and *Bacillus coli* will grow readily in all degrees of acidity which it is possible to produce in man by artificial means.

The normal acid of the urine is the acid sodium phosphate, NaH_2PO_4, and by the administration of this salt by the mouth it is possible to convert an alkaline urine into an acid urine, and to double or treble the degree of acidity of an average acid urine. The condition of the urine is of paramount importance during the administration of urotropin. If urotropin be given to a patient whose urine is alkaline or neutral it exerts no particular effect, and as a genito-urinary antiseptic is valueless. If, however, it be administered to a patient with an acid urine, a small proportion of the drug, varying with the degree of acidity, is converted to formic aldehyde, which may be detected in the urine, and which is one of the most powerful of all known antiseptics. The effect of this drug is well shown by the fact that an acid urine obtained from a patient taking urotropin may be kept almost indefinitely without undergoing ammoniacal fermentation. The significance of this hardly requires to be pointed out, but it may be desirable in infective diseases of the genito-urinary tract to obtain first an acid urine and then employ urotropine.

Of the other urinary antiseptics brief reference may be made to the two main groups—the coal-tar series of drugs and the group of essential oils. Salicylic acid may be taken to represent the former. When given by the mouth it has quite a definite action in inhibiting the growth of organisms in the genito-urinary

tract; it prevents the growth of all organisms in much the same degree without exerting any specific action on one or the other, but its action is very feeble compared with urotropin in an acid urine. Moreover, about 50 per cent. of the salicylate excreted in the urine is rendered inactive by conversion into salicyluric acid.

The essential oils, of which the oils of copaiva, cubebs or sandal-wood are most used, since they are less irritant, and therefore can be given in larger doses than most others, act unequally on different organisms; they are quite feeble against putrefactive organisms or *Bacillus coli*, but against *Staphylococci* they exert quite a powerful antiseptic action.

In conclusion, it may be pointed out that the rate of absorption of drugs from the alimentary canal may be influenced by the administration of other substances, either previously or simultaneously. One example will suffice. Alcohol is not only absorbed with great rapidity itself from the stomach and intestines, but it facilitates the absorption of other substances dissolved in it. This naturally leads one to speculate whether this action of alcohol may not account for some of the toxic effects associated with indulgence. One fact is clear: that alcohol is not the direct cause of the various cirrhoses which are commonly associated with alcoholics. But may it not be that in a proportion of these people poisonous products are formed in the alimentary canal as a result of putrefaction, and that the presence of alcohol brings about their absorption? Whether this explanation be correct or not, one such poisonous product is formed in the alimentary canal of man under certain conditions and its injection into animals leads to cirrhoses.

THE PREPARATION OF ANTI-RINDERPEST SERUM BY MEANS OTHER THAN THE INJECTION OF VIRULENT BLOOD.*

Indexed B. A. ℔

By Major F. S. H. BALDREY, F.R.C.V.S., D.V.H., I.C.V.D.

The excessive cost in the production of anti-rinderpest serum on account of the animals necessary for "controls" led to the method of augmenting the amount of virulent material by means of "peritoneal washings" or "peritoneal fluid," as it is called in Muktesar. Workers in the Manila Laboratories of the Philippine Islands were the first to inaugurate this system. The method has been adopted here, but some of the testings of serum so prepared gave irregular results and led to the following experiments to definitely decide as to its value.

The technique of preparation is comparatively simple and short as follows:—(For fuller particulars read Ruediger, *Philippine Journal of Science*, vol. iii, No. 5.)

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*Reprinted from the *Journal of Tropical Veterinary Science*, vol. vi, Part I.

Control animals which are to be bled for providing inoculable material are injected into the peritoneal cavity with varying quantities of a .5 per cent. sterile solution of citrate of potash at a temperature of about 27° C. This operation is performed one hour before bleeding the animal to death. The injection being made in the flank and the quantity of fluid depending upon the weight of the animal. The weight of hill animals varies from 100-200 lb., and the amounts injected are from 1,000-2,000 c.c. of potash citrate solution. The fluid is collected from the peritoneal cavity immediately after the death of the animal. Every precaution is taken to ensure absolute sterility throughout the operation. The amount of fluid recovered is about 50 per cent. of what is injected.

The theory is that the fluid so obtained is as virulent as blood, and experiment has shown that a very small quantity is capable of reproducing the disease in susceptible bovines. The amount of defibrinated blood obtained from one of the above-mentioned controls is 1,200-2,000 c.c., and the amount of peritoneal fluid from 800-1,400 c.c.; it is therefore seen that the material for hyperimmunizing purposes is increased to more than 50 per cent. without any increased expenditure in animals.

The advantage of the method is evident; it is, however, necessary that the serum produced by hyperimmunization with this fluid should be as potent as possible in order to minimize the amount of the dose necessary for protective purposes, especially as susceptible animals such as hill, plateau, the cross-bred European and Australian stock require many times the protective dose necessary for ordinary indigenous plains cattle.

The following observations were made to test the power of serum produced from the injection of peritoneal fluid as compared with that produced from the inoculation of virulent blood only.

Plains animals are much less susceptible than hill cattle and produce a serum of less potency. The experiment was therefore divided into two series, viz.: (*a*) the comparison of plains serum made from blood injections as against that made from peritoneal fluid injections in these animals; (*b*) hill serum made from blood inoculations as against hill serum made from peritoneal fluid injections.

Charts 1 and 2 show the method employed in the serum preparation by means of the inoculation of virulent rinderpest blood into immunized plains and hill cattle.

Charts 3 and 4 show the method employed for the preparation of the serum by peritoneal fluid inoculations in plains and hills.

It has been found in this laboratory that the inoculation of doses of peritoneal fluid cannot be increased to the extent of blood doses. It has apparently a much more toxic effect and deaths have taken place as a result of it within two to three days with all the appearances of acute toxæmia. (Plate I shows the *post-mortem* appearance of the fourth stomach of a bull which died on the third day after inoculation.) Moreover, animals do not absorb the material so well and sloughing of the skin and

abscesses are not infrequent from its use. It has been noticed that an acute inflammation sometimes follows, resulting in a dry gangrenous condition of the skin which eventually peels off as a hard scale, occasionally necessitating the destruction of the animal.

These results are not apparent unless very large doses, *i.e.*, 3,000-5,000 c.c., are given. With the same quantity of blood no such result is seen. It is not caused by the material being septic as frequent examinations have shown that the fluid is sterile, with the exception of rinderpest. Chart 5 shows the result of peritoneal fluid injection, in which death took place on the second day. There were gangrenous areas at the seat of inoculation and the animal presented the toxic *post-mortem* appearances described above. Many similar results have been obtained and the *post-mortem* appearances are always identical.

It was therefore considered inadvisable to use more than the dose indicated on the charts for the peritoneal inoculations. Although these doses are somewhat less than those of blood, they are as much as can be given to ensure absolute safety in their administration. The *post-mortem* appearance in Plate I, showing the acute inflammatory condition, is very characteristic and always seen. Chart 5 shows the course of injection in an animal so inoculated. As death took place on the second day with the toxic *post-mortem* symptoms above mentioned—rinderpest *per se* could not have been the reason, and the conclusion is that a toxæmia is the cause of death. Plains animals are much more susceptible to this toxic influence than hill cattle. It is known that plains animals are less susceptible to rinderpest than the hill, and this may account for their greater susceptibility to the toxin. The results obtained in the Philippines with peritoneal fluid are much better than ours, and this may be accounted for by the same reason, *i.e.*, that all their cattle are apparently as susceptible as our hill animals.

In both cases the rapid method of making serum is adopted, *i.e.*, plains animals only one hyperimmunizing dose, and for hills two hyperimmunizing doses. Serums prepared by the above methods were tested as follows:—

The doses are arranged on a plains animals basis; *i.e.*, so many c.c. per 600 lb. of body weight. Lingard has shown that hill animals require 18 times the dose necessary for plains animals, and as these latter are invariably susceptible, they were used for the test. Doses of 2, 4, 6 and 8 c.c. per 600 lb. were used to test the serum produced from hill animals, and doses of 6, 8, 10, and 12 c.c. per 600 lb. for serum prepared from plains animals. The doses were so arranged because the serum of plains is weaker than hills. In each case the amount of the test dose is multiplied 18 times because it is for hill animals and doses given in exact proportion as to weight in the ratio of 5 c.c. per 600 lb.

The following schedule shows the result in a tabulated form:—

Each of the above tests was done in two animals, but I only give one typical chart of each reaction:

	Doses of serum	8 cc. reaction	10 cc. reaction	12 cc. reaction	15 cc. reaction
Serum prepared by the injection of V. B.	With V. B. Plains.	Both mild reaction	Both very mild reaction	Both very mild reaction	No reaction
Serum prepared by the injection of peritoneal fluid	With P. F. Plains.	One death, one severe reaction	Both severe reaction	One death, one severe reaction	Both mild reaction

Result.—Virulent blood is a 10 c.c. serum.
Peritoneal fluid is a 15 c.c. serum.

(*a*) Therefore serum prepared from plains animals by the hyperimmunizing with virulent blood is 33.3 per cent. better than that prepared by hyperimmunizing with injections of peritoneal fluid.

	Doses of serum	4 cc. reaction	6 cc. reaction	8 cc. reaction	10 cc. reaction
Serum prepared by the injection of V. B.	With V. B. Hill	Slight reaction	Both slight reaction	Both very slight reaction	Very mild reaction
Serum prepared by the injection of peritoneal fluid	With P. F. Hill	Death	Both dead	One death, one severe reaction	Very mild reaction

Result.—Virulent blood is a 5 c.c. serum.
Peritoneal fluid is a 10 c.c. serum.

(b) Therefore serum prepared from hill animals by the hyperimmunizing with virulent blood is 50 per cent. better than that prepared by hyperimmunizing with injections of peritoneal fluid.

(*c*) Serum from plains and hills in equal parts and made by blood injections is depreciated 42 per cent. by the addition of an equal part of serum made by the method of hyperimmunizing with peritoneal fluid.

Although the above results show a depreciation in the value of the serum, it in no way detracts from the practical utility of the method, in fact, it enormously increases the inoculable material, and I may say that, but for its application the laboratory would this year have been unable to turn out anything like the quantity of serum it has done, on account of the shortage in the supply of hill animals for control purposes. It will be seen that the power of serum produced from plains animals by the inoculation of peritoneal fluid is less deteriorated in comparison to the blood method in similar animals than is the serum from hill animals prepared in the same way and compared with the blood method in hill animals. This accentuates the conclusion that the serum of rinderpest is an anti-toxic material and not entirely anti-bacterial. It has

already been noted that plains are much less susceptible than hills, and yet from a material which is evidently more toxic than blood they produce a better serum, in comparison, than do the more susceptible hill cattle.

It is generally recognized that the more susceptible an animal is to bacterial influence, the less susceptible it is to the toxin of that bacteria, and *vice versâ*. This appears to me strong evidence in favour of the above conclusion that anti-rinderpest serum is an anti-toxin. Experiments have been commenced on these lines and the result of the investigation will form the subject-matter of another paper.

Conclusions.—That the method of employing peritoneal washings to augment the amount of inoculable virulent material is a good one.

(2) It produces an anti-rinderpest serum of a high value, but less potent than that produced by blood inoculation.

(3) In comparison with serum from blood inoculations it is of greater value in the less susceptible plains animals than in the highly susceptible hill cattle.

(4) That its reaction is produced principally by a toxin which is rapidly formed under the vital influence of the peritoneal cavity.

(5) The inoculation of very large doses is not advisable in Indian cattle on account of the danger of death from toxæmia, the inability of the animals to absorb it subcutaneously, and the extreme caustic action it has upon the tissues.

(6) The method in the doses above described and which are small in comparison to the massive blood injections is valuable in that a good serum is produced.

(7) Further experiments in diluting the fluid or mixing with blood may demonstrate improvements on the system as at present practised.

[In the original, numerous charts are included showing the testing of the serum of animals prepared by both methods, and also a beautiful coloured plate showing the *post-mortem* appearances of the mucous membrane of the fourth stomach of a bull dead from the effects of a subcutaneous inoculation of peritoneal fluid.]

Review.

MEAT AND FOOD INSPECTORS' EXAMINATIONS: MODEL ANSWERS TO QUESTIONS SET BY THE ROYAL SANITARY INSTITUTE AND OTHER EXAMINING BODIES. Compiled by G. T. Billing, Meat Inspector, Finsbury, and A. H. Walker, Sanitary Inspector, St. Pancras. Pp. 156. Published by the Sanitary Publishing Co., Ltd., London, 1911. Price, 3s. 6d.

The object of this little book, as set out in the preface, is to familiarize candidates with the type of questions set by sanitary and other bodies examining for certificate for meat and food inspectors. One hundred and fifty questions have been

selected from various examination papers and arranged under headings dealing with the many and varied subjects. The headings amongst others include the following: Slaughtering; Cowsheds; Signs of Disease and Health in Living Animals; General Diseases of Animals, Fowls, and Fish; Organs in Health and Disease; Parasites and Parasitic Diseases; Bacterial Diseases; Butter, Milk, and Cheese; Eggs, Coffee, Flour, &c.; Lime-juice, Beer, and Porter; Shell-fish and Canned Foods; Law; &c.

It will thus be seen that there is a very wide range of questions to be considered. The authors have attempted to answer the various questions, and they call them "model answers." We have thus an opportunity of criticizing both questions and answers. With regard to the former, we consider that while most of the questions may be regarded as quite suitable for the candidates for the object in view, yet others strike us as being open to strong objection even on the part of the candidates. For example, take the following question: "Name the diseases that occur in animals used for food, and state briefly how they may be recognized while the animal is alive." We consider that any man setting such a question is quite unfit to be an examiner. It is utterly impossible for any candidate to answer such a question in the total amount of time allotted for the whole paper, viz., two hours. It would be more likely to take two days. The authors, however, do not shirk it and make a valiant attempt to answer it, and obviously most inadequately, in a page and two-thirds. Here is another question with a portion of the model answer. (*Q.*) What is tuberculin and how is it used? (*A.*) Tuberculin is a 40 to 50 per cent. glycerine solution of a pure cultivation of the tubercle bacillus. . . . The best position for inoculation is the side of the neck or shoulder, for here the swelling can best be observed." What swelling, we ask? But surely such questions are improper for such candidates. It requires a long course of professional training before such things can be properly understood. How then can lay meat inspectors be reasonably expected to answer them? We cannot therefore commend the book for its model answers as a whole, though undoubtedly many answers are excellent and models of conciseness. But as a guide to the type of questions likely to be met with in meat and food inspectors' examinations we welcome it. From that point of view it will be found very serviceable to future candidates.

VET.-MAJOR BARRY, F.R.C.V.S., 2nd Life Guards, was called to the Bar on June 28. The Duke of Connaught was present at the time especially to congratulate Major Barry, and was one of his sponsors. We believe Major Barry is the first officer of the Guards to be called to the Bar while still on the active list and we very heartily congratulate him.

Miscellaneous.

MR. AINSWORTH WILSON, F.R.C.V.S.

THE NEWLY-APPOINTED PROFESSOR OF VETERINARY SURGERY AND OBSTETRICS AT THE ROYAL (DICK) VETERINARY COLLEGE, EDINBURGH.

WE feel that we can unhesitatingly congratulate both The Royal (Dick) Veterinary College and Mr. Ainsworth Wilson on the latter's appointment. From the point of view alike of academic attainments, practical experience, and scientific zeal, Mr. Ainsworth Wilson's appointment is an altogether admirable one. Mr. Wilson is an old student of The Royal (Dick) Veterinary College, whence he qualified as a member of The Royal College of Veterinary Surgeons in May 1894. He holds silver medals for Cattle Pathology and Meat Inspection, for Veterinary Medicine and Hygiene, and for Materia Medica. In 1894 Mr. Wilson went to India to take up the appointment as Inspector of Contagious Diseases for the City and Port of Bombay under Veterinary-Major Mills, a position which he held for nearly four years. In 1898 he returned to Europe and held successively, or concurrently, the Inspectorship under the Contagious Diseases (Animals) Act for the Blairgowrie district, the Inspectorship under The Public Health Act for East Perthshire, and the Inspectorship under The Contagious Diseases (Animals) Act for the Witham Police Division. Mr. Wilson has also had considerable experience as a lecturer under the County Councils Technical Education Scheme both in Scotland and in England; he has lectured for The Royal Sanitary Institute, and for various other public bodies, including The National Association for the Prevention of Consumption. On tuberculosis in fact he has specialized. Besides general practice in Durham and Newcastle-on-Tyne. While Mr. Wilson was in Bombay he acted as managing assistant to the well-known firm of veterinary surgeons, Messrs. R. Scott & Co. He was for six years in practice in Blairgowrie, and for the last seven years has been conducting a very successful practice in Essex.

Mr. Wilson has many of the qualities which should make him popular as a lecturer at his old college, but valuable as popularity is, we feel convinced that he will bring to his work the still higher attainments which in the teacher enthuse and make clear the path of the student.

Mr. J. Basil Buxton, M.R.C.V.S., D.V.H., has been appointed Lecturer in Veterinary Hygiene and Dietetics. We congratulate him and wish him every success in his new sphere.

PROFESSOR A. WILSON, F.R.C.V.S.

ROYAL COLLEGE OF VETERINARY SURGEONS.

Election of Council.

At the sixty-eighth annual meeting of the R.C.V.S., at 10, Red Lion Square, on June 7, 1911, the result of the election of Council was announced as follows:—

Stockman	1,009	Wharam	646
Mettam	980	Burt	573
Barrett	932	Clarkson	453
Lawson	924	Packman	441
McCall	897	Fletcher	346
Bradley	767	Watson	322
Dunstan	721	Grasby	246

There were 17 spoilt papers, and 43 were received too late. As there were 8 vacancies the President (Mr. W. Freeman Barrett), who occupied the chair, declared the first eight to be duly elected.

The only change involved is the inclusion of Dr. Bradley in the place of Mr. Burt. It was to be expected that Dr. Bradley would be elected since his appointment as Principal of the Royal Dick College necessitated his presence as the representative of that institution. It is unfortunate, however, that Mr. Burt should be the member to lose his seat to make way for him. Mr. Burt was one of the most enthusiastic workers on the Council and the committees of which he was a member, being one who regards deeds as being of greater importance than words. We trust he will allow himself to be nominated again next year and that he will regain his seat and be able to continue his excellent work on the Council.

DISEASES AMONGST BEES.

The Board of Agriculture and Fisheries desire to inform bee-keepers in Great Britain that investigations are being carried on by their scientific advisers into the causes and characteristics of the disease among bees which has now broken out in many counties, and which originally made its appearance in the Isle of Wight. The Board would be glad to receive communications from bee-keepers whose bees have been affected by the disease, and who would be willing to supply information likely to be of service in connection with the investigations. A statement of the points upon which it is desired to obtain particulars would be sent on application. Information as to new outbreaks in districts only recently infected is especially desired. In certain cases specimens of diseased bees will be required. Correspondents are therefore requested to say whether they could send bees for examination. Bees should not be sent to the Board until asked for. Communications should be addressed to The Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W.

TWIN OSTRICH CHICKS FROM A SINGLE EGG.

THE interesting event of two ostrich chicks hatched from a single egg has recently occurred at the Ostrich Farm at Mr. Carl Hagenbeck's Zoological Park, Stellingen, near Hamburg, Germany. The egg in question was laid by a Cape hen mated with a Somali cock. At the time the egg was placed in the incubator it was observed to be somewhat larger than the others, and when hatching took place it was found to have produced two ostrich chicks, which were to all appearances absolutely normal. They were, however, attached to one another by a single navel-string or umbilical cord. The veterinary surgeon of the establishment was immediately called and the two were cut apart. They seemed, when separated, to be in every way healthy chicks, exceedingly strong and able to run about, but unfortunately they only lived four days.

As far as can be gathered, this is the first record of two perfect ostrich chicks hatching from a single egg.

Translations.

VAGINITIS GRANULOSA INFECTIOSA SUIS.

BY DR. EMIL HAUPTMANN.

Warnsdorf.

Indexed B. A. I.

CONTAGIOUS catarrh of the vagina is generally described as a specific infectious disease of cattle. In spite of a thorough overhauling of literature there is nothing to be found indicating that the complaint may affect other animals. Hutyra and Marek in their "Special Pathology and Therapy of the Domestic Animals," state that transference of the complaint to other races of animals has never been accomplished. Only de Bruin relates that he has succeeded in giving the disease to horses, sheep, goats and swine. Against this general statement I will make the following history of observations.

The owner of a large herd of pigs complained that his animals, with which he had had no difficulties for many years, had shown unwelcome changes, and despite all care, he had not been at all successful during the last year, and breeding and rearing had become profitless pursuits.

Some sows had aborted, others had only borne 2 to 4 weakly youngsters that had come to nothing. Old sows which were proved breeding animals and had previously brought forth 10 to 12 of a litter as well as young sows, were similarly affected. In spite of trying a third boar the position remained unchanged, and he had been obliged to slaughter several sows. The sows were very restless and always on the move, so that they fell away a good deal in condition. My first question was whether the owner knew anything about contagious vaginal catarrh of cattle and

whether his own herd of cows had ever suffered from the complaint.

He replied that he knew it only too well, and that he had had two years' experience of it with resultant losses as regards cows, calves and milk.

After this news the sows were examined without any difficulty, as they stood quietly during the procedure. A very interesting condition was revealed. The vulva showed nothing remarkable at first, but was swollen, and the lower angle soiled with secretion. On opening the lips nodules were immediately visible, larger than those seen in cattle and more raised, because the mucous membrane of the vagina is flatter than in cattle and almost porcelain-like in colour. It was neither yellow nor red, but the blood-vessels were prominent and tortuous and all one colour, as one sees in calves and calvers.

The enlarged follicles were not arranged rank-wise but visibly scattered about, in some animals thickly and in others sparsely, but the upper vault was less affected than the under one. The colour of the prominent nodules was red or yellow. Almost all the sows showed the same symptoms, but in the boars as in bulls no characteristic appearance could be noticed. The secretion from the vaginas was microscopically examined, and streptococci similar to those seen in cows were found. After this, treatment similar to that practised in affected cattle was undertaken and repeated disinfection of the sties performed.

The employment of bacillol capsules and ointment soon effected complete cure with disappearance of all difficulty in breeding and its dangerous sequelæ.

From this account it may be concluded that there was transference of the complaint from the cows to the pigs.

I have noticed the same condition arise in swine in a second case where diseased cattle and swine were both housed under one roof, and the cows had suffered severely from abortion and sterility. Due precautions should be taken where affected cows and swine inhabit a homestead, and the owner should be warned.

(*Tierärztliches Zentralblätt.*)

A CASE OF UTERINE TORSION IN THE MARE.

By M. REGNIER, Veterinaire à Corbigny.

Nièvre.

I was sent for on March 3, at 7 o'clock in the evening, to see a mare in an advanced state of gestation, which was put in the meadow the preceding day and was found in the evening in a ploughed field lying on its left side in a furrow (the furrow was like a big ditch separating two ploughed areas) and unable to rise. The owner told me that after being got up and taken to the stable she showed violent colic, in the course of which she tried hard to urinate. Further, she refused all food and voided hard dung balls covered with whitish mucus.

Temperature normal, ocular mucosa a livid brown tint. Although the mare was a month from the termination of gestation the vulva was tumefied and open. One could not detect a fœtus either on the right or left side.

I immediately practised vaginal and rectal exploration. The bladder was completely empty, to the great astonishment of the owner. The hand passed to the neck of the uterus without effort and without encountering any abnormal folding. The fingers introduced into the cervical orifice were met by an insurmountable obstacle. However, the neck was dilated to ascertain extent (I introduced four fingers into it) and deviated in an upward direction.

Rectal exploration rapidly established diagnosis. The rectum contained some dung balls. The hand having penetrated into the abdominal cavity passed between two spiroidal cushions, which one easily recognized as being the broad ligaments violently stretched and folded in the form of a veritable cord. The right ligament was very easy to explore from its lumbar insertion to the point where it formed a cord in front and above the left ligament. The direction of the folds of this right ligament and the position of the cord in front and above that of the left ligament made one give a probable diagnosis of torsion to the left. Besides the owner told me that from the impressions in the soil the mare had lain down on the left side, had rolled, made a half-turn on her back, and come on to the right side.

The uterus had been submitted to a displacement in the inverse way to the direction of the hands of a watch.

We put off all intervention until the morrow. On March 4 the mare was lying on a bed of straw and inclined in such a way that the anterior part of the body was downhill.

The mare was rolled to the left, at first half a turn, then several successive turns.

Rectal exploration practised after each rotation indicated no change in the position of the gravid uterus and I abandoned treatment. The animal died the same night, the illness having lasted about forty-eight hours.

Autopsy practised twenty-four hours after death gave the following results. The abdominal wall presented at its median line a fissure 80 cm. long, whose edges were inflamed, blackish, and into which the gravid uterus and the point of the cæcum had passed. In the abdominal cavity all the organs were healthy with the exception of the genital organs. The gravid uterus contained a foal of ten months in the right cornua; it had undergone a twist of a turn and a half to the left. The torsion commenced at the neck of the uterus and finished at the base of the cornua. The Fallopian tubes and the ovaries formed two blackish contiguous masses, the size of a fist. The uterine walls were congested and blackish. A collar at the base of the uterus, due to the twist, had cut off nourishment to the genital organs, causing passive congestion and expulsive efforts. Eventration had been caused by these efforts and led to shortening of the duration of the illness.

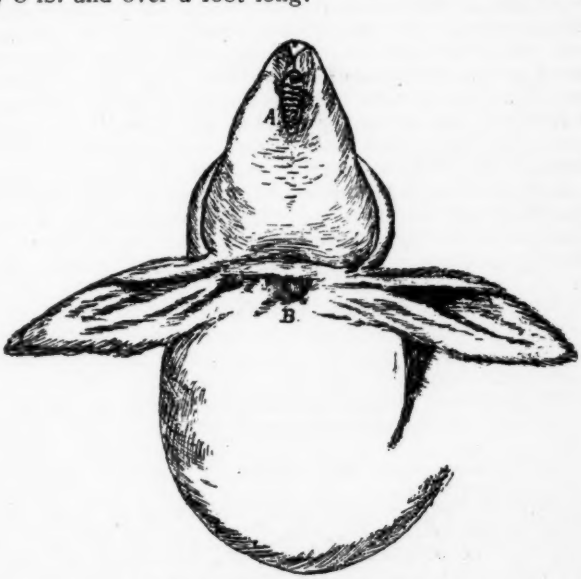
Noticeable points are that torsion of the uterus is possible in the mare in the last stages of pregnancy. Rolling on the back may cause this. Uterine torsion is very anterior; diagnosis is effected by rectal exploration. Here the uterus had twisted a turn and a half. The violence of the twist had immediately led to the colic of abortion. Contrary to what Goubaix believes, the floating colon was not comprised in the twist.

(*Revue Générale de Médecine Vétérinaire.*)

MULTIPLE ANOMALIES IN A LAMB.

By Professor C. GAVRILESCU.

The subject affected with these malformations constitutes a very rare case. A perusal of medical literature and scientific works discloses no such a similar instance. The subject was a lamb born dead at the end of the term. It was a male weighing nearly 8 lb. and over a foot long.



Subject viewed from underneath.

The Exterior.—In the region where the two branches of the inferior maxilla unite, the animal presented an elongated opening extending 2 cm., rounded in front and pointed behind (fig. I A). Through this opening the palate with its transverse grooves could be plainly seen. A stylet introduced from the front to the back in the interior of this opening fell into a cavity and stopped at

a distance of 7 cm. against a hard osseous part, which formed the depth of the cavity. By moving the stylet in several directions and percussing the hard part with it at different points I could find no orifice which permitted the stylet to pass further. This cavity was the animal's mouth. By extending the head on the neck in the cervico-cephalic angle I discovered an opening almost elliptical and extending 2 cm. in its widest diameter (fig. I B). There were no hairs round this opening and at the extremities of its transversal axis the ears originated. Underneath the cervico-cephalic opening the inferior border of the neck presented a cyst of a pasty consistence to touch. Besides the peculiarities named the exterior of the animal presented nothing abnormal.

Dissection.—The buccal cavity was formed by the palate, the cheeks with their odontoids, quite a small part of the tongue, the dental arcades of the upper jaw which were inverted towards each other in such a way that their dental table, instead of being directed downwards as in the normal state, was directed almost horizontally. The inferior wall of the mouth was formed only by skin muscles and mucosa. The inferior maxilla was absent. The mouth was obstructed at the back and its depth corresponded to 1 cm. near the cervico-cephalic opening. The pharyngo-laryngeal apparatus began at the cervico-cephalic opening; a stylet introduced at the œsophagus or trachea only came out at this opening. The nares were normal, but the nasal fossæ stopped at the level of the mouth and did not communicate with the pharynx and larynx. The other organs were normal.

Résumé.—Absence of inferior maxilla; incomplete development of the tongue; interruption of the mouth and nasal fossæ with the pharyngo-laryngeal apparatus; presence of a cervico-cephalic opening; displacement of the ears from their normal situation; presence of a congenital cyst in the inferior cervical region.

(*Arhiva Veterinara.*)

TREATMENT OF VERMINOUS BRONCHO-PNEUMONIA IN YOUNG CATTLE.

By M. PARIS.

The author has treated severe outbreaks of this affection which had decimated the herds in his district by means of Malkmus's spray—creosote 410, alcohol 40, distilled water 40. He has had very good results. He recommends taking the animals up from pasture and housing them in stalls with dry floors. As preventive treatment, avoidance of affected pasture, drainage of damp meadows, pure drinking water (filtered), and copious use of super-phosphate on the affected land.

(*Der Tierarzt.*)

AMPUTATION OF 2.2 METRES OF THE INTESTINE IN PROLAPSUS RECTI OF THE HORSE WITH FAVOURABLE RESULT.

By Veterinary-Surgeon L. J. FABRITIUS.

Abo, Finland.

On April 4, 1909, I had the opportunity of performing the radical operation in a bad case of prolapsus recti of the horse, which, in spite of severe conditions, resulted favourably.

A six-year-old pedigree mare, belonging to Farmer L. in P, had given birth without any help to a dead foal which, according to the owner, had probably come hind end first and perforated the upper vaginal wall with the hind feet, the birth taking place through the rectum. Following the strong straining a prolapsus recti occurred immediately after birth, which at first was of small extent, but in the course of a few days came out and hung down to the hock joints.

The following details show that even under exceptionally unfavourable conditions success is possible if a strong constitution in the patient aids recovery.

On my arrival at 10 o'clock in the evening I found the mare in a weak state with all four legs extended and with the prolapsed intestine necrotic, dark red, and soiled. As if the state of things was not bad enough, the owner and his man were in a drunken condition, so that I was compelled to operate with the help of two half-grown youths. In spite of the very small chance of a successful result I resolved, however, to perform the radical operation, although I was compelled to undertake it in a narrow and dirty box in the middle of the night with an extremely bad light.

After thorough disinfection of the prolapsed piece of intestine with lukewarm aloes solution, I drew it further out until it was possible to insert two sutures at right angles in healthy and uninjured tissue, whereupon I split the intestine on its upper side in the long direction, so that my left hand could be inserted into its lumen. I then put in fourteen sutures of silk in a transverse direction, whereby both serous surfaces of the intestine were brought into contact. Thereafter the intestine was cut off with the scissors about 2 cm. behind the sutures. The edges of the mucous membrane were united with ten button sutures, the rectal sutures were buttoned and cut off, and the intestinal stump pushed back into its place in the pelvic cavity. The place of suture was now in the neighbourhood of the sacrum. The extruded portion of intestine was 220 cm. (about 6 ft. 7 in.) in length! The recto-vaginal fistula was sewn with strong silk sutures, but only provisionally, because the very weak condition of the mare necessitated the operation being curtailed. The owner was given instructions in writing on diet, employment of opium, and bathing, &c.

On April 22 I examined the mare again. The suture intestine

was now completely healed. Two spool-shaped growths at the suture place, which hindered the onward movement of the intestinal contents, were cut off with the scissors. The sutures in the recto-vaginal fistula had torn out, probably because the owner had not observed the dietetic instructions given. The edges of the fistula were freshened with a sharp curette and new sutures put in.

Several months have now elapsed and I have heard nothing further of the patient.

(*Berliner Tierärztliche Wochenschrift.*)

CONCERNING A NEW MICROBE OF HÆMORRHAGIC GASTRO-ENTERITIS OF THE DOG.

By A. LUCET.

The mode of infection in hæmorrhagic inflammation of the stomach and intestine of the dog is still obscure. Recent investigations have led to no result. Either those ovoid bacteria known as *pasteurellæ* can assume an etiological *rôle*, or the results of the investigations were of value where the dejecta of sick animals was used to try and reproduce the illness in experimental animals. Further experiments, however, need to be made.

Perhaps Lucet's discovery may lead to a better understanding of the cause of the disease. He experimented with a dog that had a violent sub-acute attack of gastro-enteritis showing well-marked localized lesions. He recorded the case in the *Comptes rendus de l'Academie des sciences*, July 18, 1910. The case was noteworthy in that in the shiny exudate of the cæcum, which was dark red and fatty, a number of microbes of spirillary form were found, and these also occurred in the ileum, colon, rectum and stomach; they were absent wherever the intestine presented a normal appearance, so that the new discovery must have a direct relation to the specific disease.

Some of the spiral-formed micro-organisms were very thin (0.4 microns) and 5 to 10 microns long, and carried two, three, or four segments of loose coils; others appeared shorter, doubled thicker, showed more closed spirals and had little motility. They must not be confounded with those spirillæ found by Regaud in the internal tissue of the mucous membrane of the stomach of dogs and cats in 1909.

These spirochætæ stain badly, not at all with silver, but they take ferruginated hæmotoxylin or diluted Giemsa.

The author only notes the presence of these new microbes and makes it known. He does not know what *rôle* the microbes play, but is investigating the matter further.

(*Deutsche Tierärztliche Wochenschrift*, ex *Revue générale, Toulouse.*)

CONTRIBUTION TO THE PATHOLOGY OF THE THYMUS GLAND.

By M. L. NAUDIN.

Veterinary Surgeon, Orleans.

Indexed B. A. I.

The extreme poverty of our literature on this subject encourages me to relate the two following cases from my practice.

(1) I was urgently called to a heifer eight months old, which, while in excellent health, was taken with severe blowing, refused to eat and seemed very ill. On arriving an hour afterwards the animal was dead. Autopsy was at once undertaken. Carcase in a good state, slightly blown up, ocular mucosa slightly injected, subcutaneous connective tissue normal; no lesion in the abdominal organs; the gastric compartments contained food without over-repletion. On opening the thorax 3 or 4 litres of a limpid liquid, light red in colour, flowed from the pleural cavities; the two lungs were the site of an intense and generalized œdema, the perilobular conjunctive tissue was full of limpid serosity of a pale yellowish colour, on inflammatory lesion either in the pleuræ or pericardium; the heart arrested in diastole full of coagulated blood.

The thymus was enormous; it represented a bi-lobed mass 25 centimetres long, 15 wide and 10 thick; incised, it was juicy and filled with a crowd of hæmorrhagic points. In the absence of other lesions necessary to explain the pulmonary œdema which had led up to so sudden a death, I recalled the case of sudden deaths in children which doctors attribute to-day to hypertrophy of the thymus, without the pathogeny of these accidents being elucidated (vascular nervous or tracheal compression of a reflex nature acting on the pneumogastric or vitiation of the internal secretion of the gland).

(2) A mountain dog aged six years was brought to me because he was frequently attacked with a dry intermittent cough. His condition was good, auscultation and percussion revealed nothing. I gave him for some months expectorants, calmatives and iodides without result; finally the attacks became more frequent, difficulty in breathing appearing in the slightest effort at running or gambolling, and emaciation following. I expected tuberculous adenopathy of the tracheo-bronchial glands, and advised slaughter, which was agreed to.

At the autopsy immediately after death the carcase appeared thin and the mucosæ pale, the abdominal cavity showed no lesion. On opening the thorax I was struck by the existence in its anterior part of a whitish ovoid mass with a slight depression running its entire length and dividing it into two equal lobes. Its largest antero-posterior diameter measured 20 centimetres, its smallest 10 c.c.; its consistence was soft and fluctuating; its superior face was traversed by a groove lodging the trachea and œsophagus. The lungs, whose anterior lobes were folded back on each other, were healthy; no exudate in the pleuræ nor pericardium, no glandular lesions.

Incised, this mass, from its situation, form, and connections,

probably the thymus persisting abnormally and considerably hypertrophied, was constituted by a fibrous membrane limiting a closed cavity filled with numerous lobules containing a sort of fluid jelly resembling clotted milk. This stuff included in the mediastinum had evidently played from a pathogenic point of view the same rôle as adenopathies of this region in the production of the accidents heretofore mentioned.

(*Revue Générale de Médecine Vétérinaire.*)

CONTRIBUTION TO THE STUDY OF PERICARDITIS IN THE DOG.

By Professor LANFRANCHI of Modena.

La Clinica Veterinaria.

Pericardites are very rarely recorded in the dog and published observations attribute almost all of them to specific inflammations. This record concerns a Russian grey hound 14 months old, visited on November 16. The owner had only possessed the animal a few months. To combat signs of rickets he had overfed the dog on flesh with the addition of phosphates, and this was successful. For some days there had been a small appetite, increased prostration, and accelerated and difficult respiration (26 to 28 per minute). The conjunctivæ were hyperæmic. The extremities cold; rectal temperature 40·6° F. Heart beat very energetic accompanied by slight vibratory murmurs; pressure over the precordial region caused great pain. Resonance of the thorax was normal save in the cardiac region where the zone of percussion was enlarged. Heart beats 110 per minute were regular; there was a slight mesosystolic friction audible at the level and base of the fifth rib. There was a slight venous jugular pulse.

These signs led to the diagnosis of pericarditis. It was a primitive pericarditis for all the other organs were healthy, but it was most difficult to establish its nature. Of possible hypotheses rheumatismal pericarditis was the most probable. Two frictions daily with tincture of iodine, friction of the extremities with alcohol, and alternate administration of a solution of salicylate of caffein and sodium, and tincture of digitalis were prescribed.

On the 17th the general state was aggravated; dysphagia, urine rare, no defecation—scrotal œdema, jugular pulse accentuated; 28 to 30 respirations. The temperature which was 41·2 on the evening of the 16th was 40·7 on the morning of the 17th, and 40·4 in the evening. Same treatment with fragments of gelatine and two injections, one of milk and one of broth.

The 18th, state still bad. Scrotal œdema increased and reaching the hind limbs, 100 cardiac pulsations. The area of percussion increased, painful crises in the night with anguish and difficult deglutition. The dysphagia seemed connected with painful irradiation provoked by the passage of a ball in the œsophagus. Tincture of strophanthus and digitalis were substituted.

The 19th, same state, cardiac intermittences, respirations 28, pulse 96. Tincture of strophanthus regularly vomited, so returned

to digitalis. On the 20th, less dyspnœa and jugular pulse less marked. The patient sought drink and swallowed gelatine well.

On the 21st, continued improvement, effusion being reabsorbed, cardiac percussion area and friction diminished. Temperature 38·8 ; pulse 80. Improvement continued the following days and December 2 all symptoms had disappeared ; a little extension of the cardiac percussion zone only existed.

This observation shows two points not indicated in the classics : (1) Sensibility of the hypochondria immediately above the scyphoid appendix of the sternum ; (2) difficulty of deglutition, noticed up to the present in man only.

(*Revue Générale de Médecine Vétérinaire.*)

VAGINITIS INFECTIOSA SUIS.

By W. WIELAND.

Wangerin.

After an outbreak of contagious vaginal catarrh among the cows of the Blankenhagen estate had almost subsided, the steward's notice was called to 17 breeding sows, none of which had become pregnant. He thereupon castrated the boar and had the sows covered by a fresh sire. The result was no more successful than before. After the 17 sows had been covered four times and 6 different boars been employed, 2 of them became pregnant. The sows were shown to me on March 4. I examined 4 of them and found in 2 a severe streaky inflammation of the vaginal mucosa especially in the neighbourhood of the clitoris, and in the other 2 a purulent discharge. I will report again later on the course of the illness and its treatment. My view is that there was transmission of the disease from the cows to the swine, and yet we have hitherto supposed that the complaint was peculiar to cattle.—*Berliner Tierärzt Woch.*

A FAILURE OF DIAGNOSIS.

By W. B. SWITZER.

Oswego, N.Y.

A nine-year-old wagon horse showed a hard swelling as big as a cocoanut in the middle of the neck. It was slightly moveable between the muscles of the neck. According to the owner it was about the size of a walnut at first, and had been growing for five years. A year and a half previously a veterinary surgeon had considered it an unripe abscess, and applied a sharp blister. The author, who considered this tumour to be an encapsuled abscess, opened it very cautiously. To his astonishment very severe bleeding occurred. The blood spurted out under strong pressure, and the hæmorrhage endangered the life of the horse. After widening the incision and removal of hard hæmatomatic material (about 1¼ kilogrammes in weight), the vessel (rupture

of one of the upper arteries of the neck) was tied with catgut, and the hæmorrhage stopped. Healing of the wound took three weeks. After six months, ruffled hair at the site of the incision was about all that could be seen.

(*American Veterinary Review*, ex *Deutsche Tierärztliche Woch.*)

DANISH CO-OPERATIVE ABATTOIRS.

THE remarkable development of co-operation in Denmark calls for the attention of all those concerned with agriculture and sanitary questions. According to Hollman (writing in the *German Journal of Agriculture* for 1907), in 1903 there were twenty-nine co-operative abattoirs practising the slaughter of pigs for exportation. The estimate of agriculturists syndicated in these concerns was 67,200. In 1907 there were thirty-four co-operative slaughterhouses with 93,300 adherents. Of these thirty-four co-operative abattoirs, twenty-four were private slaughterhouses. About a third of the establishments in the whole country where pigs are fattened are adherent to societies existing for co-operative slaughtering, and more than half of the pigs slaughtered annually are sacrified in the corporate abattoirs. In some parts of Denmark co-operation has quite entered into the daily life of the producers; thus in the island of Borholm 85·8 per cent. of pigs killed are slaughtered at the co-operative establishments, and 53 per cent. of the breeders are adherent to these abattoirs. It is conjoint effort of societies which produces an average of 25 to 108 tons of meat a year, from which the supply to the co-operative abattoirs is chiefly derived.

(*L'Hygiène de la Viande et du Lait.*)

Letters and Communications, &c.

G. Mayall; P. R. Thompson; Lieutenant Stewart; Secretary, Royal College of Veterinary Surgeons; Secretary, Royal (Dick) Veterinary College; L. M. Douglas; E. W. Bevan.

Books and Periodicals, &c., Received.

Journal of Meat and Milk Hygiene; Journal of the Royal Army Medical Corps: Proceedings of the Royal Society of Medicine; Board of Agriculture and Fisheries: Department of Agriculture and Technical Instruction for Ireland; Tropical Agriculturist; Agricultural Journal for the Union of South Africa; Bureau of Animal Industry.

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